MA.21-3

Data Sent by Jim Sullivan to DOE Recd 10/7/81

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
631 PARK AVENUE
KING OF PRUSSIA, PENNSYLVANIA 19406

B2729
2.14.6

26 JUN 1979

The Commonwealth of Massachusetts
Department of Public Health
Division of Health Care Standards & Regulation
ATTN: Mr. Gerald S. Parker, Director
Radiation Control Programs
80 Boylston Street, Room 835
Boston, Massachusetts 02116

Dear Mr. Parker:

Enclosed for your information and retention is a copy of the NRC, Region I Investigation Report No. 078-154-A which documents our investigation into the source of the radioactive material found at the privately owned landfill in Norton, Massachusetts.

The report has been prepared in two parts. Confidential - Restricted data has been intentionally omitted.

The Town of Norton has been provided with a copy.

Should you have any questions on this report or related matters, feel free to call.

Sincerely,

George H. Smith, Chief
Fuel Facility and Materials
Safety Branch

Enclosure:
As stated

LOOK TO PLACE MARKS FOR IMPORTANT INFO + REPORT NUMBERS (NORTON LANDFILL = SHPACK LANDFILL)

141

7908010

222

MA.21-3

4-7

THE COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF CORPORATIONS AND TAXATION
240 STATE HOUSE, BOSTON, MASS.

ARTICLES OF ORGANIZATION

We, John S. Mechem, Frederick J. Robbins and Charles E. Goodhue 3d

being a majority of the directors of

M C N I
M & C NUCLEAR, INC.

elected at its first meeting, in compliance with the requirements of General Laws, Chapter 156, Section 10, hereby certify that the following is a true copy of the agreement of association to form said corporation, with the names of the subscribers thereto:

We, whose names are hereto subscribed, do, by this agreement, associate ourselves with the intention of forming a corporation under the provisions of General Laws, Chapter 156.

The name by which the corporation shall be known is

M & C NUCLEAR, INC.

The location of the principal office of the corporation in Massachusetts is to be in the city or town of Attleboro, and outside Massachusetts, the city or town of , State of

[The business address of the corporation is to be

Ferry Avenue, Attleboro, Massachusetts

Street and number (if office building, give room number), city or town.

If such business address is not yet determined, give the name and business address of the treasurer or other officer to receive mail.

)

Name and title of officer to receive mail and his complete business address.

Leave this space for binding

The purposes for which the corporation is formed and the nature of the business to be transacted by it are as follows:

M.

To manufacture, assemble, fabricate, process, produce, purchase, receive, lease as lessee, or otherwise acquire, own, hold, store, use, repair, service, maintain, mortgage, pledge, or otherwise encumber, sell, assign, lease as lessor, distribute, and otherwise dispose of, and generally to trade and deal in and with, as principal, agent or otherwise, special nuclear materials, nuclear fuel elements, radioactive materials, fissionable materials bearing slurries, dispersions or particle aggregates, radioactive isotope devices and components, reactors, reactor controls, reactor shielding, electronic devices, parts, systems and mechanisms, chemicals, metals and allied or incidental elements, and materials, and any and all machinery, tools, equipment, appliances, devices, supplies and materials used or useful in connection with or incidental to any of the foregoing.

To engage in and transact the business of research in nuclear physics, chemistry, metallurgy and electronics and allied or incidental fields; to carry on investigations and experiments of all kinds; to originate, develop, improve, record and preserve any discoveries, inventions, processes, formulas and improvements and to build, purchase, lease, acquire, own, hold, use, maintain, improve and operate radio isotope and other laboratories, factories, offices, structures and works and any articles, materials, machinery and equipment used for or in connection with any business of the corporation.

[illegible]

F.Y. Dec. 31

Texas Instruments, Incorporated (A) (Condensed)

ON APRIL 17, 1959, Texas Instruments Incorporated (TI) of Dallas, Texas, merged with the Metals and Controls Corporation (M & C) of Attleboro, Massachusetts. One of the fastest growing large corporations in the country, TI had achieved a compound annual growth from 1946 through 1958 of 38% in sales and 42% in net income. The president had publicly predicted that volume would more than double in 1959 to a sales level near $200 million. Almost half this growth, he added, might come through mergers, with M & C contributing $42 million to $45 million. To date TI's principal business had been in electronic and electromechanical equipment and systems, semiconductors and other components, and exploration services for oil, gas, and minerals.

So highly was TI regarded by the market that in May 1960 its common was selling at about 70 times the 1959 earnings of $3.59 a share.

M & C ACTIVITIES

Itself the product of a 1932 merger and a postwar diversification, M & C had three major groups of products: clad metals, control instruments, and nuclear fuel components and instrumented cores. The company had grown steadily, and in 1959 had plants in two U.S. locations and five foreign countries. Reflecting predecessor corporation names, the clad metal lines were known as General Plate (GP) products, and the control instrument liens were known as Spencer products. Included in the former were industrial, precious, and thermostat metals; fancy wire; and wire and tubing. Included in the latter were motor protectors, circuit breakers, thermostats, and precision switches. Among these Spencer lines there were some that utilized GP products as raw materials; i.e., GP thermostat bimetals and GP clad electrical contacts.

Apart from a portion of GP's precious metal products which went to

key considerations), most GP and Spencer products had to be designed to specific customer requirements and produced to customer order. Thus engineering know-how and close coordination between the sales and production departments on delivery dates were important. Owing to the technical nature of the products and also to their fast-changing applications, a company sales force with a high degree of engineering competence was essential. To serve its several thousand customers, many of whom purchased both Spencer and GP products, the company maintained a force of 50 men in the field, divided into Spencer and GP units.

With Spencer products facing important competition from four other firms in the $10 million to $40 million annual sales bracket, tight control of costs was important for securing the large orders generally placed by the kinds of customers to whom these products were sold. Buyers included manufacturers of fractional horsepower motors, household appliances, air conditioning, and aircraft and missiles. In contrast, GP industrial metals met no direct competition, although clad metals for industrial uses met with competition from alloys.

M & C's PREMERGER ORGANIZATION

At the time TI took over M & C, a task force of four junior executives had just completed, at the acting president's request, a critical study of M & C's organizational structure. So far its nuclear activities had been conducted by an entirely separate subsidiary, and the GP and Spencer activities had been organized as shown on Exhibit 1.

Under the acting president at the top level came a tier of predominantly functional executives (the vice presidents for marketing, engineering, and finance, the treasurer, and the controller). At the third and fourth levels of command, the structure increasingly showed a breakdown by product lines. For example, at the fourth level in manufacturing there were four separate groups corresponding to the major Spencer lines, and six separate groups corresponding to the major GP lines. Approximately the same breakdown appeared among the fourth-level product specialists in marketing. Although there was no profit responsibility at this level, the controller had been sending marketing's product specialists a monthly P & L by product line, in the hope of encouraging informal meetings among the people in marketing, engineering, and production who were working on the same lines.

Even at the second level, the predominantly functional division of responsibilities was neither complete nor unalloyed. Thus the vice president for marketing was also the vice president of Spencer Products, and in this capacity he had reporting to him the Spencer engineers. As a result, the company's vice president of engineering was, in effect, the vice president only of GP engineering, although he also served in an other-than-functional role by acting as the vice president of M & C International. (In 1958 exports and other foreign sales totaled about $2 million.)

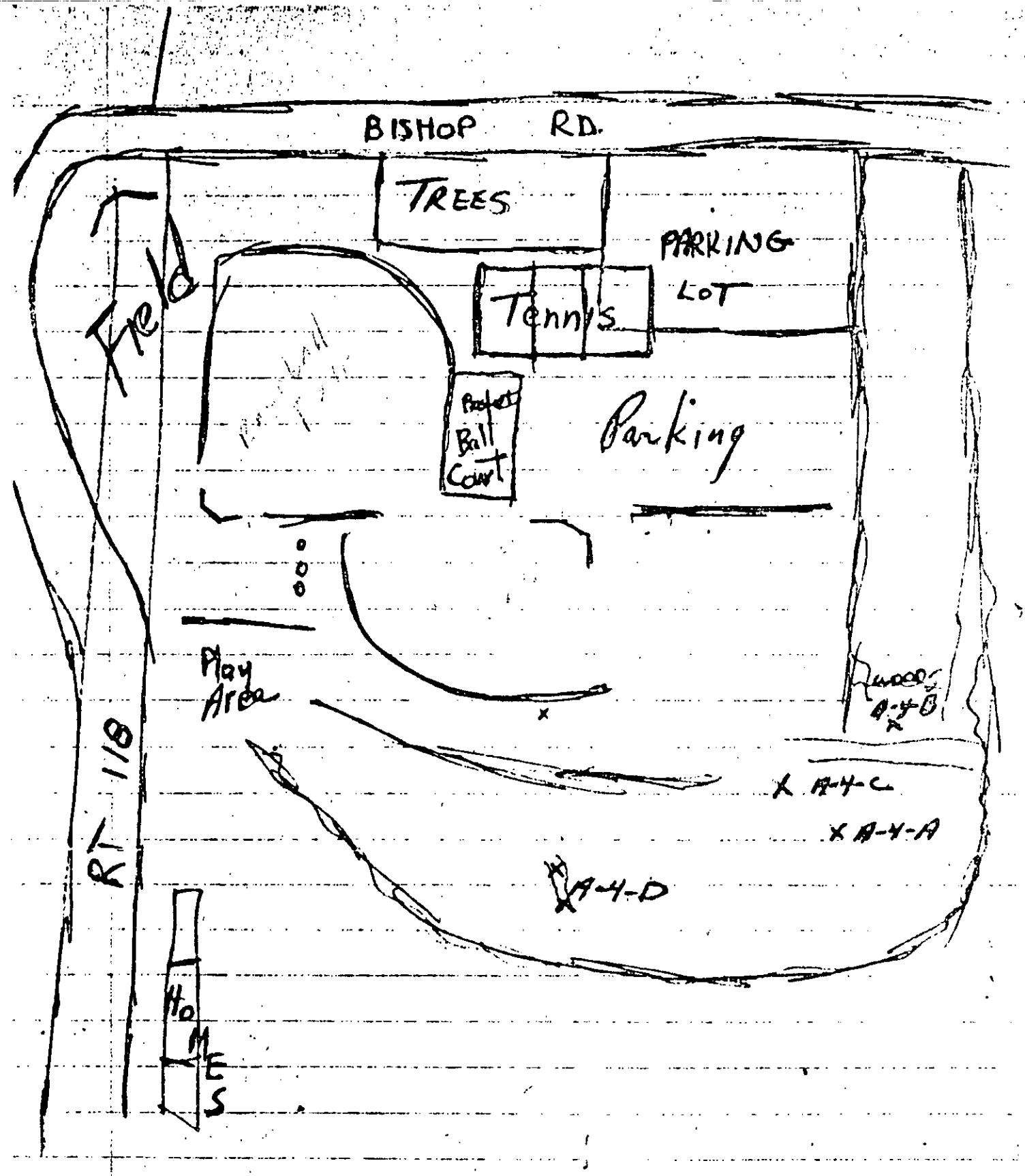
I. INTRODUCTION

As directed by the Administrator of the Energy Research and Development Administration (ERDA) and the Chairman of the Nuclear Regulatory Commission (NRC), a proposed action plan has been prepared for improving the control and protection of nuclear materials at commercial facilities possessing strategically significant amounts* of high enriched uranium and plutonium. This proposed action plan has been prepared by a joint ERDA-NRC task force during the period from March 17 to May 17, 1976. This report summarizes the task force activities and recommendations.

Background

On March 12, 1976, the Administrator, ERDA, and the Commissioners, NRC, along with senior members of their staffs, met to review the status of safeguards investigations and evaluations conducted by the NRC during the previous three months. This review highlighted what appeared to be chronic difficulties at several facilities in meeting the NRC accountability requirements, as well as weaknesses in nuclear materials control and protection procedures as practiced by several facilities under current NRC regulations. While accountability problems were most evident at bulk processing facilities handling large quantities of materials for ERDA contract programs, the nuclear materials control and protection at most commercial facilities handling highly enriched uranium or plutonium was judged to be less than that desired by both ERDA and NRC.

*Two kilograms of plutonium or five kilograms of uranium-235 (contained in uranium enriched to more than 20 percent in the U-235 isotope). The significant quantities for special nuclear materials are established at a level judged to be substantially less than that required for the illicit manufacture of a nuclear explosive.



NOTES: ① Trees near sites marked with orange spray paint

② X DENOTES SPOTS WHERE RADIOACTIVITY WAS FOUND

③ A-4-A, ETC., IS SAMPLE NO.

MA.21-3

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report No. 078-154-A - Part 1 of 2

Subject: Radioactive Material in Uncontrolled Location, Norton, Massachusetts

Investigation at: Norton and Attleboro, Massachusetts

Investigation conducted: November 14, 28-30; December 1, 7, 8, 21, 1978; January 9-12, 1978

Investigators: R. E. Shepherd, Physical Security Inspector — 3-9-79 date signed

R. H. Smith, Investigation Specialist — 3-9-79 date signed

J. Roth, Fuel Facility Inspector — 3/12/79 date signed

Approved by: O. W. Devlin, Chief, Security and Investigation Section, Safeguards Branch — 3/13/79 date signed

Investigation Summary:

Investigation on November 14, 28-30; December 1, 7, 8, 21, 1978; January 9-12, 1979 (Report No. 078-154 - Part 2)

Area Investigated: Investigation of an allegation by Mr. John Sullivan, 33 Chartley Brook Lane, Attleboro, Massachusetts, that Texas Instruments, of Attleboro (TI) possibly had discarded radioactive material at a private landfill area in Norton, Massachusetts where he had detected radioactivity at various locations.

Results: It was determined that M&C Nuclear, Inc., Attleboro, Massachusetts, which merged with TI in 1959, had used the aforementioned landfill area to discard trash and other material, including burned zirconium ashes, associated with nuclear fuel operations conducted at the TI facility from about 1957 to 1966. Based on NRC's review of TI's nuclear operations at that location and the analyses of the radioactive material found at the Norton landfill area, it is possible that TI was the major source of that material. Other possible sources of the radioactive material could not be determined because of the limited amount of radioactive physical evidence found at the Norton site.

7908010 154

2222

MA.21-3

TABLE OF CONTENTS

I. BACKGROUND

A. Reason for Investigation

On September 22, 1978, Mr. John Sullivan, 33 Chartley Brook Lane, Attleboro, Massachusetts, telephonically contacted the Nuclear Regulatory Commission, Region I office (NRC:I) and reported that he had visited a private landfill area in Norton, Massachusetts, which contained discarded industrial equipment. He said that several of the items which he observed at the site indicated that they had been discarded by Texas Instruments, Inc. (TI), of Attleboro, Massachusetts and that he believed that the discarded TI items might possibly be radioactive.

On October 16, 1978, Mr. Sullivan telephonically contacted NRC:I and reported that he visited the aforementioned landfill area on October 6, 1978 and, using a beta-gamma survey meter, found several items which emitted varying amounts of radiation. On October 18, 1978, NRC:I received a letter from Mr. Sullivan in which he requested an investigation of the landfill area and furnished additional information regarding his observation of radiation readings on specific items discarded there. On November 14, 1974, Mr. Sullivan was interviewed by NRC:I inspectors at his school address in Florida. During the interview, he said that he saw the names "Texas Instruments", "Metals and Control" and "Engelhard" on some of the items which he observed during his visits to the aforementioned landfill area. He also said that he does not suspect any other company, besides TI, of dumping radioactive material at the above landfill area. He also identified fifteen other locations, some in Norton and some in Attleboro, Massachusetts, where he suspected radioactive material had been discarded.

B. Identification of Organizations Contacted

1. Patsy Cavalieri and Son, 279 Elm Street, Attleboro, Massachusetts

   This is a general contractor concern whose operations include railroad construction.

2. DeAngelis Railroad Construction, 9 Irving Street, Worcester, Massachusetts

   This is a general contractor concern whose operations include railroad construction.

3. Dorrance Construction Company, Norton, Massachusetts

   This is a general contractor concern whose operations include excavation and road construction.

4. Engelhard Industries Division, Engelhard Minerals & Chemicals Corporation, Route 152, Plainville, Massachusetts

   This company's operations include the processing of chemicals and precious metals.

5. Texas Instruments Incorporated, Attleboro, Massachusetts

   This company's operations include the processing of precious metals.

6. Westcott Construction Corporation, 135 East Washington Street, North Attleboro, Massachusetts

   This is a general contractor concern whose operations include building construction.

II. SUMMARY OF FINDINGS

A. Allegations and Investigation Findings

The allegations reported by Mr. John Sullivan regarding the suspected presence of radioactive material at various locations in the Norton-Attleboro area were investigated. These allegations and the investigation findings are detailed in NRC:I Investigation Report No. 078-154, dated March 1, 1979. Included in that report are the results of numerous radiological surveys of the suspected locations reported by Mr. Sullivan and the results of the analyses of the radioactive material found at two of these locations during the course of the investigation.

Concurrent with the aforementioned investigation efforts, NRC:I inspectors investigated the allegation made by Mr. Sullivan regarding the possible source of the radioactive material which he reportedly detected at the private landfill area, located at 68 Union Road, Norton, Massachusetts, during his visits there. This NRC:I investigation included an on-site visual examination of the items discarded at that location. Interviews with individuals residing in that general area and individuals presently or formerly employed by TI, including contractor personnel, and a representative of Engelhard Industries Division, Engelhard Minerals & Chemicals Corporation, Plainville, Massachusetts, were also conducted during this investigation.

NRC:I inspectors observed at the Norton landfill site some of the items which Mr. Sullivan described as bearing the names "Texas Instruments" and "Metals and Control". One item was observed to have the partially obliterated words "Engelhard Industries, Inc. Irvington...Newark, New Jersey" printed thereon.

Information was developed through interviews with TI personnel and other individuals regarding the radioactive waste disposal, trash removal, and construction activities which were conducted at the TI facility in Attleboro during the period of time in question.

It was verified that TI had dumped various items at the private landfill area in Norton where Mr. Sullivan had detected radioactivity. However, the investigation failed to substantiate that TI had discarded the radioactive material which was found at the above site.

B. Conclusions

The allegation that TI was suspected of discarding industrial equipment at the Norton landfill area (Shpack property) has been verified through interviews with TI personnel and other individuals. It was also determined that M&C Nuclear, Inc., Attleboro, Massachusetts, which merged with TI in 1959, had used the aforementioned landfill area to discard trash and other material, including burned zirconium ashes, associated with nuclear fuel operations conducted at the TI facility from about 1957 to 1966. Based on NRC's review of TI's nuclear operations at that location and the analyses of the radioactive material found at the Norton landfill area, it is possible that TI was the major source of that material. Other possible sources of the radioactive material could not be determined because of the limited amount of radioactive physical evidence found at the Norton site.

868

III. DETAILS

A. Introduction

On September 22, 1978, Mr. H. W. Crocker, Chief, Fuel Facility Projects Section of the NRC Region I Office (NRC:I) received a telephone call from Mr. John Sullivan, 33 Chartley Brook Lane, Attleboro, Massachusetts. Mr. Sullivan reported that he had visited a private landfill area on Union Road near the border of Norton and Attleboro, Massachusetts which contained discarded industrial equipment. Mr. Sullivan stated that he had observed several items at the site that indicated they had been discarded by Texas Instruments, Inc. (TI) of Attleboro, Massachusetts. Mr. Sullivan further stated that no materials had been disposed of at this location within the last several years. However, since TI does have an NRC license to use radioactive materials, Mr. Sullivan believed it was possible that the discarded TI items might be radioactive. Mr Crocker informed Mr. Sullivan that the TI plant is involved in large metallurgical operations and that only a small part of TI's work involves radioactive materials: Mr. Crocker told Mr. Sullivan that NRC:I was not aware of any radioactive material being discarded at this site and that NRC:I would look at this landfill area in conjunction with the next inspection at TI. Mr. Sullivan was satisfied with this course of action, and indicated he was returning to college in Florida the next week, but that NRC:I could contact him through his Massachusetts address.

On October 16, 1978, Mr. Sullivan called Mr. Crocker from Florida and reported that he had gone to the aforementioned landfill area on October 6, 1978, and using a Civil Defense, beta-gamma, survey meter found the following:

1. A black bowl with yellow residue which read 3 mR/hr.

2. A tube attached to a brick-lined oven which read 2 mR/hr.

3. Several other items were 2-3 times the background radiation level.

4. A soldering hood which, although suspect, read at the background radiation level.

On October 18, 1978, NRC:I received a letter from Mr. Sullivan. This letter requested an NRC investigation of the landfill site. Included was a sketch of the site and the route Mr. Sullivan used in his survey of October 7 and 8 during which he observed radiation readings on or near the discarded equipment of up to 3 mR/hr.

On November 14, 1978, during an interview with Mr. Sullivan, at his school address in Florida, NRC:I inspectors were informed by Mr. Sullivan that there were about a dozen other places within an area approximately one square mile, some located in Norton and some in Attleboro, which he suspected of having radioactive material. The reasons given were their remoteness and evidence of industrial waste which Mr. Sullivan had seen at those locations. Mr. Sullivan described these locations as being "older" than the Norton site and he said that the industrial waste consisted of solid, liquid and metal material. Mr. Sullivan stated that he had written a letter to Mr. Crocker of NRC:I and had included maps of these additional locations. Mr. Sullivan had not yet mailed the letter. At the conclusion of the interview, Mr. Sullivan furnished the hand-drawn maps of the additional locations to the NRC inspectors but retained the letter, which he stated he would mail to Mr. Crocker. The final number of sites indicated as "suspect" at this time by Mr. Sullivan was fifteen (15).

B. Scope of Investigation

This investigation was initiated on November 14, 1978 and included an on-site visual examination of items discarded at the Norton landfill site in an effort to determine the source of any identifiable items that could be related to NRC-licensed activities. Interviews were conducted with Mr. John Sullivan and other persons residing in the general vicinity of the Norton landfill site concerning their knowlege of any refuse disposal activities at that site. Interviews were conducted with present and former TI personnel and contractor personnel with regard to radioactive waste disposal operations, construction activities, off-site hauling of trash or other material from the TI site and the disposal of any TI material at the Norton landfill site.

A representative of Engelhard Industries Division of Engelhard Minerals & Chemicals Corporation, Route 152, Plainville, Massachusetts was interviewed regarding the decontamination and radioactive waste disposal operations associated with the former operations of D.E. Makepiece Division of Engelhard Industries at the above location in Plainville.

C. Individuals Directly Interviewed and/or Contacted During the NRC Investigation

Patsy Cavalieri and Son, 279 Elm Street, Attleboro, Massachusetts

Mr. Anthony Cavalieri, President

DeAngelis Railroad Construction, 9 Irving Street, Worcester, Massachusetts

Mr. Andy DeAngelis, President
Mr. Joey DeAngelis, Estimator

Dorrance Construction Company, Norton, Massachusetts

Mr. Melvin Dorrance, President

Engelhard Industries Division, Engelhard Minerals & Chemicals Corporation, Route 152, Plainville, Massachusetts

Mr. George H. Scott, Jr., General Manager

Texas Instruments Incorporated, P.O. Box 5474, Dallas, Texas

Mr. George L. Williams, Assistant Vice President
Mr. Robert D. Murrill, Assistant Counsel

Texas Instruments Incorporated, Attleboro, Massachusetts

Mr. William I. George, Assistant Vice President
Mr. Fred Sherman, Project Manager
Mr. John A. Haug, Patent Counsel
Mr. Calvin Hopper, Manager, Nuclear Safety
Mr. Robert Gonzales, Security Administrator
Mr. Francis F. Gousie, Precious Metals Department
Mr. Kenneth McLeod, Grounds Foreman
Mr. Alfred Amancio, Grounds Keeper
Mr. Raymond Brogan, Maintenance Division
Mr. William Bird, Former Vault Custodian
Mr. Anthony F. Ferreira, Facility Engineer
Mr. Cleo Forcier, Group Safety Engineer

Westcott Construction Corporation, 135 East Washington Street, North Attleboro, Massachusetts

Mr. Charles H. Whitmore, Jr., Project Manager & Safety Director

Other Individuals

Mr. John Sullivan, temporarily residing at 588 West Pine Road, Melbourne Village, Florida
Mr. William R. Rollinson, Director of Attleboro Office of Civil Defense
Mr. David Opatka, Director of Conservation, Town of Norton, Massachusetts
Mr. Fred Huff, 481 Pike Avenue, Attleboro, Massachusetts
Mr. Jesse Earls, 463 Pike Avenue, Attleboro, Massachusetts
Mr. Harold Wetherall, 8 Union Road, Chartley, Massachusetts
Mr. Gerard Gelinas, 43 Oakdale Avenue, Attleboro, Massachusetts
Individual A (identity withheld by request)
Individual B (identity withheld by request)
Individual C (identity withheld by request)

D. Specifications of Allegations

The information which Mr. John Sullivan reported to NRC:I on September 22, 1978, included the allegations that TI had discarded some items at a private landfill area in Norton, Massachusetts and that he believed it was possible that the discarded TI items might be radioactive. This landfill area is located at 68 Union Road, Norton, Massachusetts and is owned by Mr. and Mrs. Isadore Shpack.

The information which Mr. Sullivan reported to NRC:I on October 16, 1978 included the allegation that during his visit to the aforementioned landfill area on October 6, 1978, certain items which he saw there were found to be radioactive, as determined by the radiation detection equipment which he was using on that occasion. During the interview with Mr. Sullivan on November 14, 1978, he said that he saw the names "Texas Instruments," Metals and Control" and "Engelhard" on some of the items which he observed during his visits to the aforementioned landfill site. He said that he also saw what he described as "rods" at the Norton site and that it was these items which made him suspect that TI was dumping "things"

at the site. He also said that he does not suspect any other company, besides TI, of dumping radioactive material at the aforementioned landfill area. During the interview with Mr. Sullivan on November 14, 1978, he also identified fifteen other locations, some in Norton and some in Attleboro, which he suspected of having radioactive material discarded there.

E. Allegations and Investigation Findings

1. Allegation No. 1

(a) Allegation

It was alleged that radioactive material had been disposed of at a private landfill area (Shpack property) in Norton, Massachusetts and at fifteen other locations, some located in Norton and some in Attleboro, Massachusetts.

(b) Findings

As previously noted in Paragraph II.A, this allegation was investigated and the investigation findings are detailed in NRC:I Investigation Report No. 078-154, dated March 1, 1979.

2. Allegation No. 2

(a) Allegation

It was alleged that TI had discarded industrial equipment at a private landfill area in Norton, Massachusetts (Shpack property) and that the discarded TI items might possibly be radioactive.

(b) NRC Findings

The investigation findings regarding the radiological surveys conducted at the aforementioned landfill area are detailed in NRC:I Investigation Report No. 078-154, dated March 1, 1979.

Interview of John Sullivan, temporarily residing at 588 West Pine Road, Melbourne Village, Florida, on November 14, 1978. Mr. Sullivan furnished the following information to NRC Inspectors J. Roth and R. E. Shepherd: Mr. Sullivan said that he has lived in Attleboro, Massachusetts, for about 8 years and his parents' home is in close proximity to the private dump site in Norton which is owned by Mr. and Mrs. I. Shpack. He said that he is majoring in geology studies at college and has for a long time been concerned about the environmental aspects of the water at the wetlands and the general environmental protection of the area in his neighborhood in Attleboro.

He said that during the Winter of 1977, he read in a local newspaper, the Narraganset Times, about an accident involving "a truck from Texas Instruments (TI) which was carrying fuel rods." He said that this was the first time that he associated his environmental interests with TI and that upon reading the newsclip about the accident, he knew that they were making nuclear fuel at the TI facility in Attleboro.

He said that he visited the Norton dump site on a number of occasions and did some research on TI's operations by reviewing documents at the Public Document Room (PDR) in Washington, D. C., where he stopped enroute to college in Florida.

Mr. Sullivan showed the inspectors a photograph which he said he had taken at the Norton dump site on October 7, 1978. In the photograph there appeared to be a lot of debris or junked items including a number of black cylindrical plastic canisters, measuring about 1 inch in diameter and 2 inches in length, which he said had the name "Texas Instruments" printed on them. He said that he also saw what he described as "rods" at the Norton site and that it was these items which made him suspect that TI was dumping "things" at the site. He said that during his visits to the Norton site on other occasions he found a piece of sheet metal, measuring about 3 inches square, which was mounted on a piece of wood and which had the words "Metals and Control" written on the metal. He said that while he was at the Norton site he also saw some metallic plates, measuring about 2 feet by 3 feet and approximately 1/16 inch thick which he thought might be HFIR (High Flux Isotope Reactor) plates and which he was able to cut with a pair of tin snips. He said that based on his review of records at the PDR, concerning TI operations, he believed that TI was producing HFIR plates.

Mr. Sullivan said that he also saw at the Norton dump site some discarded wooden boxes, measuring about 12 feet long and 3 inches by 4 inches on the sides, which had the name Texas Instruments stenciled on the boxes. He said that when he was at the Norton dump site he spoke with Mrs. Shpack, the owner of the property, and she told him that Texas Instruments and other companies dumped their trash removals on that site.

Mr. Sullivan said that he had also visited the Norton dump site in July 1978 and had made approximately 6 visits there. He said that he also saw the name Engelhard on some of the items dumped there.

Mr. Sullivan said that he does not suspect any other company, besides TI, of dumping radioactive material at the Norton site. He said that there is no one, other than himself, who has expressed suspicion about radioactive material being dumped at the Norton site and that no one, other than himself, has expressed any opinion that such material came from TI. He said that he never saw, nor knows anyone who saw, the radioactive material being dumped there.

Visual examination of the Norton dump site on November 29, 1978.

NRC Inspector R. E. Shepherd made a visual examination of the Norton dump site and observed the following items scattered among the trash which had been dumped there:

1. A metal plate, approximately 3 inches square, which was attached to a banded wooden crate which measured about 4 feet square. The metal plate included the words "Metals Co., Attleboro, Massachusetts, NICOSEAL CO."

2. A 3-sided metal item, in the form of a duct, 2 sides of which measured about 4 feet square with a 3rd side measuring about 4 feet by 1 foot, which had the words "Metals & Controls" written thereon.

3. A wooden board, measuring about 6 feet long, 3 1/2 feet wide and 1 inch thick, which bore the words "Texas Instruments, Inc., Metals and Controls Division, 34 Forest Street, Attleboro, Massachusetts."

4. A large number of plastic items, measuring about 2 inches by 1 3/4 inches and 1/4 inch thick, with the words "KLIXON, Metals and Controls Inc., Corporate Division of Texas Instruments, Attleboro, Massachusetts, Made in U. S. A." printed thereon.

5. A large number of plastic containers, measuring about 1 1/2 inches long and 1 inch in diameter, with the words "Texas Instruments, Attleboro, Massachusetts, 1015C SER.1, MV, 6STI-1-1" printed thereon.

6. The top from a 55 gallon drum, with the partially obliterated words "Engelhard Industries, Inc. Irvington...Newark, New Jersey" printed thereon.

Interview of Mr. Fred Huff, 481 Pike Avenue, Attleboro, Massachusetts, on November 29, 1978. Mr. Huff furnished the following information to NRC Inspector R. E. Shepherd: Mr. Huff said that it is a wild guess on his part that the radioactive material which was found at the Norton dump site (Shpack property) came from somewhere locally and that he did not know who dumped the material there.

During the interview with Mr. Huff, he flagged down a passing car driven by his neighbor, Mr. Jesse Earls, 463 Pike Avenue, Attleboro, Massachusetts, whom he invited to participate in the interview.

Interview of Mr. Jesse Earls, 463 Pike Avenue, Attleboro, Massachusetts, on November 29, 1978. During the interview with Mr. Fred Huff, Mr. Earls furnished the following information: He said that he has resided at the above address for about 5 years. He said that Texas Instruments (TI) trash trucks pass by his house almost every day and that he saw them go to the Attleboro Landfill Corporation dump site at least a couple of times when he also had gone there. He said that he did not know who dumped the radioactive material at the Norton dump site.

Interview of Individual A, who requested that his name be keep confidential. Individual A furnished the following information to NRC Inspector R. E. Shepherd on November 30, 1978. He said that Fred Fontaine and George, whose last name he could not recall but whom he described as retired from Metals and Controls, dumped trash every day at the Shpack dump site in Norton since September 1946. He said that 2 other Metals and Controls employees, Al Amancio and Joe Carr, also dumped there and drove in a 1958 Chevrolet black stake truck which was used strictly for the Nuclear Division of Metals and Controls. He said that Mr. Carr did not drive the truck but served as a "co-pilot" for Mr. Amancio and that they came with the truck to the Norton dump most of the time, whereas Mr. Fontaine and George (last name not recalled) would substitute for them at other times.

He said that in 1958 some trash was dumped at the Attleboro Landfill Corporation (ALC) dump site and that the trash included a sign which read "Metals and Controls, Nuclear Division, Contaminated Beyond This Point." He said that the incident regarding the sign was brought to the attention of Metals and Controls with a request that such trash be taken elsewhere in the future.

He said that he does not know who dumped the radioactive material at the Norton dump site (Shpack property) and said that only "Attleboro people" dumped at that site.

He said that Gaudet and Boyer Company has been hauling Texas Instruments (TI's) rubbish for about 2 years and that TI hauled their own rubbish prior to that.

He said that the bank (slope) on the north side of the ALC contains about 3 feet of loam which came from the TI site and was initially taken to a gravel pit on Harvey Street, Norton, Massachusetts, and later taken to the ALC location mentioned above. He said that this gravel pit is owned by Dorrance Construction Company which does excavation work for TI.

Interview of Mr. Harold Wetherall, 8 Union Road, Chartley, Massachusetts, on November 30, 1978. Mr. Wetherall furnished the following information to NRC Inspector R. E. Shepherd: With regard to the radioactive material which was dumped at the private dump (Shpack property) in Norton, Mr. Wetherall said that he thinks that the material may have come from Texas Instruments (TI) or from Thompson Chemical Company which was formerly located in Seekonk or Attleboro, Massachusetts. He said that Thompson Chemical had a fire around 1962 or 1963 and moved out, possibly to Freetown, Massachusetts, and may now be operating under another name.

Mr. Wetherall said that he owns the property where the electric power lines pass through the Shpack property in Norton and that he has owned this property for about 25 years. He said that he sold an easement to Massachusetts Electric Company whereby they are permitted to run their power lines through the property. The City of Attleboro had previously operated the dumping area now known as the Attleboro Landfill Corporation (ALC). He said that it was "local stuff" that was dumped at the Shpack dump site. He said that he knows that TI dumped material at the Shpack dump and that this knowledge is probably based on his conversation with Mr. Shpack. Mr. Wetherall said that he does not know if Thompson Chemical dumped anything at the Shpack dump.

Mr. Wetherall said that he believes that in the 1950's he saw TI trucks dumping at the Shpack dump site. He said that he does not recall the type of trucks which he saw. He said that he also saw TI trucks dump at the ALC site when it was being operated by the City of Attleboro.

Interview of Mr. Fred Sherman, Project Manager, Texas Instruments (TI), Attleboro, Massachusetts, on December 1, 1978. Mr. Sherman furnished the following information to NRC Inspector R. E. Shepherd: He said that TI was known as Metals and Controls from about 1914 to 1958 at which time they became known as Metals and Controls Division of TI. Around 1965 they dropped the words Metals and Controls from their name. He said that Patsy Cavalieri and Son, 279 Elm Street, Attleboro, Massachusetts, constructed a railroad spur at TI around 1965. Mr. Sherman said that he checked with TI's accountability section and thinks that the records (regarding the railroad spur) were destroyed. The railroad spur was put in after Metals and Controls had completed a nuclear fuel fabrication job. He said that Cavalieri Company would know more about the details of the railroad spur construction and whether or not any digging was necessary in connection with that job. He said that the TI employee who supervised the railroad spur job for TI is Al Bright who is no longer employed there. Mr. Bright was employed in the Plant

Engineering Facilities section. Mr. Sherman said that he did not know if it (the railroad spur construction) was a totally contracted job. He said that Al Bright now works for C. E. Maguire Inc., 31 Canal Street, Providence, R. I. Later, on this date, Mr. Sherman showed R. Shepherd an engineer's drawing, dated February 28, 1966, for the railroad spur job.

R. Shepherd examined the engineering drawing of the railroad spur project, which included an elevation scale drawing. It would appear from an examination of the drawing that the job required a buildup of material to lay the railroad bed, rather than an excavation of material, from a point near the corner of Building 10 to the point where the railroad spur connected with the existing railroad track. The only excavation necessary for the railroad bed appeared to be from a point beginning at approximately one-third of the length of Building 10, on the southwest side of the building, and extending alongside the building (in a northwest direction) toward the end of the building. Mr. Sherman said that the paved road which was constructed on the south side of Building 10 and which intersects the railroad spur, was built by Narraganset Improvement, Providence, R. I., and that, based on an aerial photograph of the TI site which Mr. Sherman showed to R. Shepherd, the road construction was done about the same time as the railroad spur job.

Mr. Sherman suggested that Bill Bird and Frank Gousie, who are presently employed at TI, might possibly have information regarding trash removal operations at the TI site.

Interview of Mr. Francis F. Gousie, Precious Metals Department, Texas Instruments (TI), on December 1, 1978. Mr. Gousie furnished the following information to NRC Inspector R. E. Shepherd in the presence of Mr. Fred Sherman of TI: Mr. Gousie said that anything that came from M&C Nuclear Division and which was dumped at the Norton dump (Shpack property) was "clean." He explained "clean" to mean that it had been thoroughly screened by Health Physics personnel. He said that from about 1957 or 1958 until the phase out time (of Building 10) around 1965, they burned contaminated clothing and zirc chips outside in a furnace on the south side of Building 5. He said that they did not burn uranium and that any ash from the burning operation was shipped out to a U. S. Government burial site. He said that Cleo Forcier was the Health Physics technician in charge of screening the material taken from TI for dumping

purposes. Mr. Gousie said that he brought trash to the Shpack dump site in Norton about once a day, after the phase out of Building 10. He said that he did this until about 1968 and that there were 4 other men who were involved in the trash removal operation and whom he named as follows: Fred Fontaine, whom he described as retired and living in a trailer park in North Attleboro; Al Amancio, who still works at TI; Kenny McLeod, who, he said, was the foreman and who still works at TI; Frank Liberace, whom he described as retired.

Mr. Gousie said that all of the trash that was taken to the Shpack dump site was taken there after the phase out (of Building 10). He said that they had 2 dump trucks and that it was usually one man using the truck at any one time. He said that if he had any doubt about anything being loaded onto the truck for dumping he would have Cleo Forcier check it out, that is, anything that they picked up when cleaning out the "yard," which he described as a fenced-in area around Building 5.

Mr. Gousie said that there were times when he delivered dirt to the Shpack dump site but that it was not dirt taken from the yard. He said that there was no excavation done in the yard area. He said that he brought about 2 loads of dirt to the Shpack dump site.

Mr. Gousie was reinterviewed on January 9, 1979, by NRC Inspectors R. E. Shepherd and R. H. Smith in the presence of TI representatives F. Sherman and J. A. Haug, TI's Attleboro Patent Counsel. Mr. Gousie and the above individuals visited the fenced-in area around Building 5 and he pointed out the approximate locations where he said that he burned contaminated clothing, including work shoes, in an outside incinerator, and where he burned zirc (zirconium) chips at another location within the fenced-in area. This second area was estimated to be approximately 300 feet away from the incinerator location. He said that he also burned some wooden skids with the zirc chips. He said that the dirt which he took to the Norton dump site, as previously reported by him to R. E. Shepherd on December 1, 1978, consisted of the ashes from the burned zirc chips and from the wooden skids mentioned above.

Interview of Individual B, who requested that his name be kept confidential.
Individual B furnished the following information to NRC Inspector R. E. Shepherd on December 7, 1978. He said that he worked at Texas Instruments (TI) as a private consultant and/or as a representative for a private company which did work for TI at various

times between 1975 and 1976. During this time he had occasion to visit TI approximately 20 to 25 times, about 30 minutes to 2 hours each time. On no occasion had he visited any area where radioactive material was handled nor was there any contaminated material in those areas which he visited.

Individual B said that while he was at TI he knows that they used local dumping grounds and has seen a TI truck at the Norton landfill area (Shpack property). He said that it was a pickup truck, possibly blue, with Texas Instrument's name and a map of Texas on the driver's door. He said that he saw the truck there a couple of times during 1975 and 1976. He said that he did not know who was driving the truck or how many people were in the truck. He said that he did not actually see the people in the truck dump anything at the landfill area nor did he see them pick up anything. He said that he was just driving by the dump on these occasions. While he was at TI during 1975 and 1976 he saw open TI trucks taking dirt and/or trash from the TI site about 3 or 4 times but he does not know where the trucks took the dirt or trash and he is not positive as to whether it was dirt and/or trash in the trucks, because of the lapse of time between then and now. He said that he never saw TI dump anything at the Norton site which he knows or believes to be radioactive or contaminated material and no one has ever told him that they saw this happen.

He said that when he picked up and read the NRC's press release about the radioactive material found at the Norton landfill area, for some reason the name TI immediately came to his mind, perhaps because he saw TI trucks there, as mentioned above, and because he did not think that TI's Health Physics (HP) program was "all that good." In this regard he said that he had no definitive reason to say that TI's HP program was not good except for his past conversations with TI people and because he knows that TI called in a consultant to discuss advising TI on the HP aspects of setting up a "hot shop" which indicated to him that they (TI) cannot be "all that good" in the HP area. With regard to the TI people with whom he had spoken, he said that he did not recall their names, job responsibilities or the areas where they worked at TI.

Interview of Mr. George L. Williams, Assistant Vice President, Texas Instruments (TI), Dallas, Texas, on December 7 and 8, 1978. Mr. Williams was interviewed at the TI facility in Attleboro, Massachusetts, and furnished the following information to NRC Inspector R. E. Shepherd in the presence of TI representatives F. Sherman and R. D.

Murrill, TI's Assistant Counsel, Dallas, Texas. He said that Metals and Controls Corporation is the corporation which initially made fuel plates at the TI facility on a very small scale. As the activity grew in size, M&C Nuclear Incorporated became a wholly-owned subsidiary of Metals and Controls Corporation around 1957. Mr. Williams was President and General Manager of the fuel fabrication operation of M&C Nuclear, Incorporated from 1958 to about 1967. Metals and Controls Corporation had nothing to do with the nuclear fuel operation when M&C Nuclear, Incorporated came into existence. He said that Metals and Controls Corporation, together with M&C Nuclear, Incorporated merged with TI in 1959 and Building 10 was phased out of the nuclear fuel activity in 1966.

Interview of Mr. Kenneth McLeod, Grounds Foreman, Texas Instruments (TI), Attleboro, Massachusetts, on December 7, 1978. Mr. McLeod furnished the following information to NRC Inspector R. E. Shepherd, in the presence of TI representatives F. Sherman, G. L. Williams, and R. D. Murrill: Mr. McLeod said that he had no knowledge of any burning activity on the TI site and that he had no knowledge of any soil or dirt being removed from the TI site. He said that he would not be involved in anything like that. He said that he was the foreman of the truck drivers who took trash from the TI site and that he was referring here only to Buildings 1, 2, 3, and 4. He said that he had no responsibility for any of the waste or trash removal from Building 10. He said that the drivers who were working for him were Fred Fontaine, George (whose last name he could not recall), and Frank Liberace (now retired).

Mr. McLeod said that Frank Gousie came on the grounds as a garden laborer and had nothing to do with the removal of trash from the site. He also said that Mr. Gousie would not be involved in removing any dirt from the site. He said that TI always saved all the dirt that they could.

With regard to the railroad spur construction around 1965, he said that he saw the spur being built and recalled that they put in a railroad bed with stones or rocks and that they had to move some dirt aside. He said that he did not know how deep the railroad bed was or what they did with the dirt which was pushed aside when preparing the bed. He said that he did not see any of the dirt being moved from the railroad bed location. He said that he never saw anyone, who worked in the nuclear fuel activity, burning anything outside.

Mr. McLeod said that Mr. Gousie worked under his supervision. He said that from about 1957 until 1966, "they" (TI) had one dump truck. The trucks would go offsite with trash from Buildings 1, 3, and 4 and the trash would go to the Norton dump (Shpack property) from about 1957 until about 1972 when TI got a compactor and dumpsters. He said that he very seldom, about 3 or 4 times a year, drove any trash to the Norton dump. He said that Fred Fontaine took trash to the dump the most often, about twice a day, and that later on, George (last name not recalled) took the most trips to the dump. He said that Frank Gousie very seldom (about 3 or 4 times a year) took trash to the Norton dump. He said that Joe Carr came to work for him (Mr. McLeod) around the same time that Mr. Gousie did and that Mr. Carr did the same kind of work that Mr. Gousie did. He said that Mr. Carr did landscaping work such as pruning shrubs. He said that he did not think that Mr. Carr hauled any trash to the Norton dump. He said that Mr. Carr was employed in the nuclear division but that he did not know in what capacity. He said that Mr. Carr worked in the nuclear activity prior to coming to work for him. He said that he does not know how long he (Carr) worked for Metals and Controls and said that he did not know if Mr. Carr is still employed at TI.

Mr. McLeod said that was unaware that a sign bearing the words "M&C Nuclear Division, Contaminated Beyond This Point," reportedly had been dumped at the Attleboro Landfill Corporation dump site. He said that he had no knowledge of any onsite burial area of material at the TI site.

Interview of Mr. Alfred Amancio, Grounds Keeper, Texas Instruments, Attleboro, Massachusetts, on December 7, 1978. Mr. Amancio furnished the following information to NRC Inspector R. E. Shepherd in the presence of TI representatives F. Sherman, G. L. Williams, and R. D. Murrill: Mr. Amancio's present supervisor is Mr. Kenneth McLeod. His former supervisor was Mr. Ray Brogan who is still employed at Texas Instruments (TI). When Mr. Amancio worked for M&C Nuclear (under Mr. Brogan's supervision), Mr. McLeod worked for Metals and Controls (the non-nuclear operation). (Mr. Fred Sherman mentioned during this interview that the nuclear fuel operation in Building 10 began around 1956 or 1957 and lasted until about 1966.) Mr. Amancio said that he made 3 or 4 trips each day to the Norton dump (Shpack property) to dump trash consisting mostly of paper, cardboard, and probably some piping. He said that when he loaded the trash

truck he would have a helper with him all the time while loading the truck which he described as a black Chevrolet platform dump truck (stake truck), possibly weighing 2 tons. The truck had the words "M&C Nuclear" on the side of the door. He said that he went to work for Mr. McLeod around 1960 or 1961. He said that the only steady man that he (Amancio) had helping him load the truck was Joe Carr. Mr. Amancio said that he does not recall that Mr. Carr ever drove the truck. He said that he cannot recall hauling any dirt off the TI site. Regarding the railroad spur construction around 1965, he said that he does not know if any excavation was necessary in order to make the spur. He said that he did not know or could not recall seeing any dirt being removed from the TI site.

Mr. Amancio said that he recalled that he burned zirc (zirconium) chips in an area which was opposite Building 11 in the present visitor parking lot for Building 12. He said that he burned the zirc chips, and only zirc chips, once or twice a week from about 1956 or 1957 until about 1960. He said that Joe Carr helped him burn the zirc chips which, he said, came from Building 10. He said that he never burned any contaminated material and never saw anyone burn such material. He said that this was the only burning operation which he knows about. He said that everything else went to the Norton dump site.

Mr. Amancio said that Toby Knoll (phonetic) had charge of the M&C grounds until his retirement and that Mr. Knoll had nothing to do with the nuclear activity. He said that he does not know anything about any trash removal from TI prior to 1956 or 1957 when he was transferred to M&C Nuclear from the precious metals refinery. He said that he never saw anyone scan or survey the trash which he hauled to the Norton dump. He said that Fred Fontaine and another man picked up trash from M&C and that this trash had nothing to do with the nuclear operations in Building 10. He said that he never entered the contaminated area of Building 10 and never hauled or took anything away from Building 10 as trash. He said that Frank Gousie never worked for him and that if there was any burning operation anywhere on the site, except where he said that he (Amancio) burned zirc chips, then he is not aware of it. He said that Joe Carr did not drive any trucks off site. He said that Mr. Liberace worked for Mr. McLeod and that Mr. Liberace drove the rubbish packer down to the Attleboro Landfill Corporation dump site but did not go with trash to the city dump. He said that Mr. Liberace came

to work at TI about 12 years ago, long after the phase out of Building 10 and that Mr. Liberace picked up trash from all over the site, including Building 10 after the close out (phase out) of that building.

Mr. Amancio was shown a diagram of the TI site by R. Shepherd and he indicated on the diagram the approximate area where he burned zirc chips, as mentioned above.

Interview of Mr. Raymond Brogan, Maintenance Division, Texas Instruments, (TI), Attleboro, Massachusetts, on December 8, 1978. Mr. Brogan furnished the following information to NRC Inspector R. E. Shepherd in the presence of TI representative Robert D. Murrill: Mr. Brogan said that in July 1957, he changed jobs from Metals and Controls to M&C Nuclear and that he worked in that role in Building 10 from July 1957 through 1964. He said that 95 per cent of his duties were in the maintenance area and that he had no manufacturing responsibilities in the fuel fabrication area. The other 5 per cent of his duties consisted of a manufacturing responsibility with regard to handling finished fuel plates up through the final assembly process. He said that, by reason of his job responsibilities in the maintenance operation, he had occasion to be in a contaminated area on a daily basis. He said that all of the protective clothing, such as shoe covers, were put into 55-gallon barrels and sent to a laundry in Connecticut and transported there, and returned to TI, by a TI truck or by common carrier. He said that some shoe covers were disposable and that those which were not disposable were washed, and that the water that was used for washing them was saved. The barrels of water which were accumulated from the washing operation were shipped to Oak Ridge, Tennessee. He said that a salvage area was set up in Building 5, around late 1958 or 1959, to evaporate the water and collect the sludge.

Mr. Brogan said that he had no knowledge of any radioactive material or contaminated clothing going from TI to the Norton dump (Shpack property).

With regard to any burning operation on the TI site, he said that the only thing that they burned was zirc chips in a gravel pit and that they had joint excercises or training sessions with the Attleboro Fire Department and the Fireman's Insurance Association, both of whom participated in fire-extinguishing drills during the zirc-burning operation.

Mr. Brogan was shown a diagram of the TI site by R. E. Shepherd and Mr. Brogan indicated on the drawing the approximate area where the zirc burning operation occurred. This area is situated at a point on the diagram approximately midway between Buildings 11 and 12. Mr. Brogan said that they ceased burning zirc in that area, but that he could not recall when they did so, and that they moved the zirc burning operation to an area on the southeast side of Building 5. Mr. Brogan also indicated the approximate location of this area on the diagram shown to him by R. Shepherd.

Mr. Brogan said that he did not know who did the burning (of zirc) at the first location mentioned above. With regard to the second location, he said that he did not know if Arthur Hanson, who left the company in 1960 or 1961 and who designed the water evaporator in Building 5, did any of the burning of zirc outside at the second location. He said that Jeff Gelinas, who is now retired, did some of the burning at this second location. Mr. Brogan said that as far as he knows, only zirc was burned outside. He said that when they installed the evaporator unit in Building 5, all of the water was evaporated there and that they shipped out the sludge to an approved burial place, the location of which he did not know. Mr. Brogan said that he had working under his supervision Al Amancio who was responsible for grounds-keeping and for hauling trash in the M&C truck, which later was designated as the TI truck, to the Norton Landfill (Shpack property). He said that in 1957 they set up a completely separate grounds maintenance operation and that Mr. Amancio was responsible for the grounds having to do with the nuclear operation. He said that Mr. McLeod was responsible for all other grounds. Mr. Amancio had this job from 1957 to about 1963 and reported to Mr. Brogan during this period. After 1963 Mr. Amancio reported to Mr. McLeod. Mr. Brogan said that he (Brogan) "lost" the responsibility in approximately 1963 and 1964 but got it back again around 1964. He said that Mr. McLeod was responsible for maintenance work related to the nuclear operation in 1963 until the phase out (of Building 10) in 1966. He said that Mr. Amancio picked up only trash from the clean area of Building 10. He said that he is not sure of what Mr. Amancio's pick-up area was when Mr. Amancio began to report to Mr. McLeod in 1962 or 1963.

Mr. Brogan said that they bought a compactor around 1963 or 1964 and that about 95 per cent of all rubbish that left the site left in the compactor truck. Those who drove the compactor truck were Al Amancio, Frank Liberace, and Fred Fontaine. He said that Joe

Carr drove the stake dump truck and that Mr. Carr reported to Mr. Amancio. He said that he does not know if Mr. Carr drove the compactor truck. He said that anything that came out of Building 10 and went into the compactor was clean in that it would come from a clean area. He said that if there was any question about an item being contaminated, Health Physics personnel would always be involved in checking it and that nothing would leave the site without Health Physics approval. He said that Cleo Forcier was a Health Physics Technician and reported to Peter Loyson, the Health Physics Officer, during a period sometime between 1957 and 1966. Mr. Loyson was succeeded by Peter Duff who was later succeeded by Norman Weiss who is still employed at TI.

Mr. Brogan said that he does not recall seeing any dirt or earth being removed from the TI site. With regard to the railroad spur that was built around 1965, he said that the whole railroad spur area was located in a generally swampy area and that he recalls that his colleague, Al Bright, who was the Facilities Engineer on the job, mentioned to him that they ran into some peat bogs or peat pockets. He said that Mr. Bright left TI in 1970 to take another job.

Mr. Brogan said that many times he saw Health Physics personnel checking for contamination (for example, taking smears) on outgoing trucks which were taking "stuff" from the contaminated area of Building 10. He said that he never saw them (Health Physics personnel) do the same thing with trucks going to the Norton dump site.

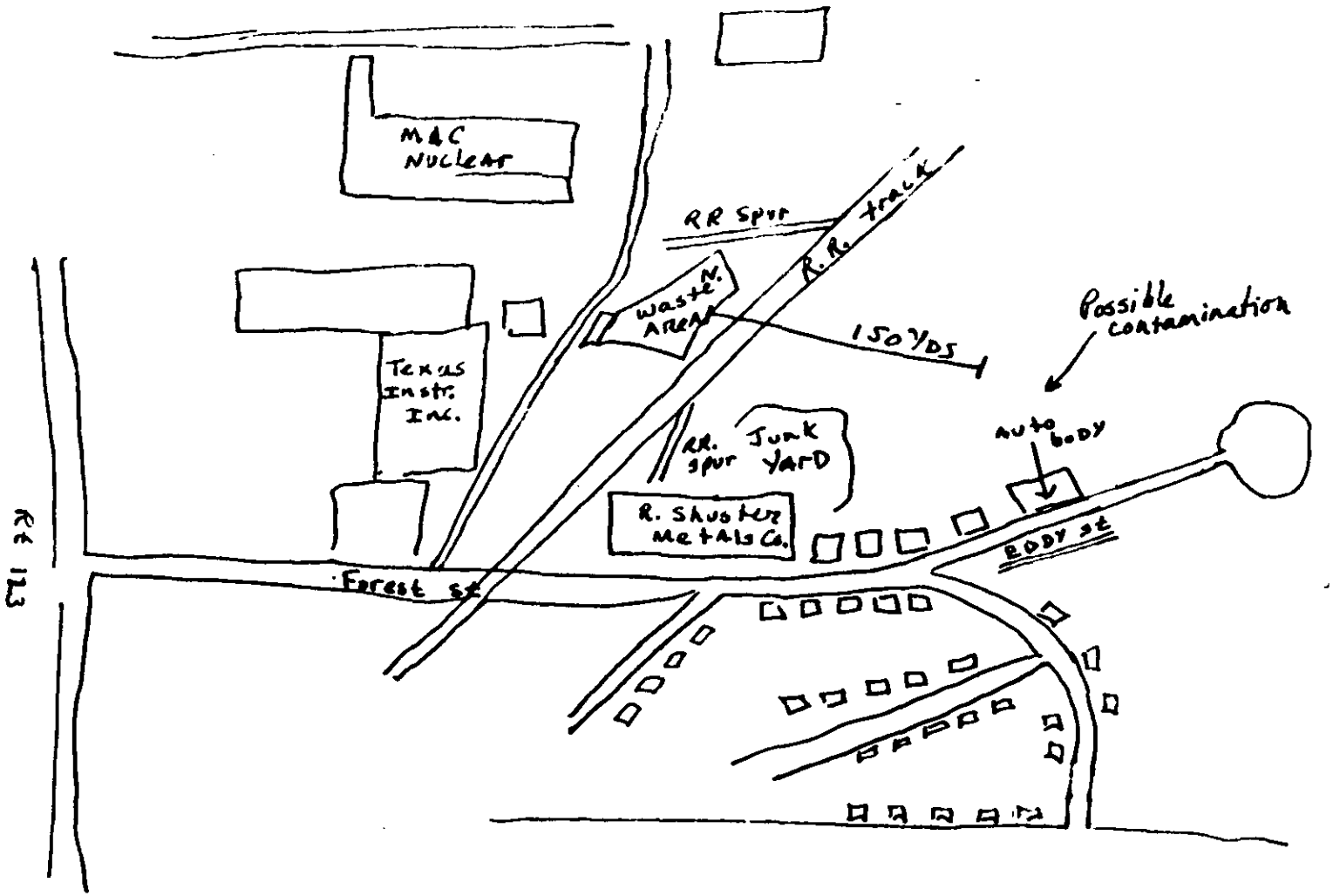
Mr. Brogan said that they had what they called a "stockade" which was a parking (storage) area for contaminated waste going to an approved burial site. The stockade included 55-gallon drums and contaminated debris in containers and it had a 6-foot high cedar fence around it. Mr. Brogan was shown a diagram of the TI site by R. Shepherd and he indicated on the diagram the approximate location of the stockade which appears to have been located opposite the south side of Building 10 in an area which is now a paved parking area.

Mr. Brogan was re-interviewed on January 9, 1979 by NRC Inspectors R. E. Shepherd and R. H. Smith in the presence of Mr. Fred Sherman and Mr. John A. Haug, TI's Attleboro Patent Counsel. Mr. Brogan furnished the following additional information: He said that it

was approximately sometime between 1959 and 1962 when the zirc-burning operation was moved from the previously noted area (in the general vicinity of Buildings 11 and 12) to the area on the southeast side of Building 5. He accompanied Messrs. Shepherd and Smith to the latter area and pointed out the approximate area where the zinc-burning operation took place. This area was observed to be approximately 300 feet away from the southeast side of Building 5.

With regard to the protective clothing which was sent to a laundry in Connecticut, as previously mentioned by Mr. Brogan, he said that it would have been someone working in the shipping and receiving department who was responsible for that operation. He said that Dwight Patton was responsible for shipping and receiving and that there are a number of people still working at TI who would have had those responsibilities at that time.

Interview of Mr. Gerard (Jeff) Gelinas, 43 Oakdale Avenue, Attleboro, Massachusetts, on January 9, 1979. Mr. Gelinas furnished the following information to NRC Inspectors R. E. Shepherd and R. H. Smith: He said that from about 1963 to 1967, he was employed at Texas Instruments (TI), which was then known as Metals and Controls, and his position was supervisor of the waste area or scrap reclamation area which was a fenced-in area near Building 5. He said that an incinerator was located outside Building 5, in a lean-to structure with a stack, adjoining Building 5. He said that they burned low level contaminated paper, containing natural uranium, in the incinerator. They also burned some cardboard, but did not burn any clothing or metal. The material which was burned came from work benches in Building 10. He said that the contaminated material which was burned was of too low an enrichment to be sent to Oak Ridge, Tennessee. Those who burned the contaminated material included himself, Joe Carr, Frank Gousie, and Ray LaChance. He said that George Beard was responsible for shipping "stuff" (contaminated waste) to Oak Ridge. He said that Ray LaChance lives in Plainville and that Joe Carr lived in Norton. He said that the ash from the incinerator was shipped to Oak Ridge. He said that the contractor who did the decontamination job at Building 10, after the phase out, was Bill Dunlap who is now deceased. The "decon" job at Building 10 involved steam cleaning and painting of the area. The water from the steam was brought to Mr. Gelinas to be evaporated in Building 5, after which the sludge was put into sealed drums and sent to Oak Ridge. The burning in the incinerator


M&C NUCLEAR
RR spur
R.R. track
N. Waste AREA
150 YDS
Possible contamination
Texas Instr. Inc.
RR. spur
Junk YARD
Auto BODY
R. Shuster Metals Co.
Rt 123
Forest st
Eddy st

D = homes

4-7

THE COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF CORPORATIONS AND TAXATION
240 STATE HOUSE, BOSTON, MASS.

ARTICLES OF ORGANIZATION

We, John S. Mechem, Frederick J. Robbins and
Charles E. Goodhue 3d

being a majority of the directors of

M C N 7
M & C NUCLEAR, INC.

elected at its first meeting, in compliance with the requirements of General Laws, Chapter 156, Section 10, hereby certify that the following is a true copy of the agreement of association to form said corporation, with the names of the subscribers thereto:

We, whose names are hereto subscribed, do, by this agreement, associate ourselves with the intention of forming a corporation under the provisions of General Laws, Chapter 156.

The name by which the corporation shall be known is

M & C NUCLEAR, INC.

The location of the principal office of the corporation in Massachusetts is to be in the city or town of Attleboro, and outside Massachusetts, the city or town of , State of

[The business address of the corporation is to be

Perry Avenue, Attleboro, Massachusetts

Street and number (if office building, give room number), city or town.

If such business address is not yet determined, give the name and business address of the treasurer or other officer to receive mail.

]

Name and title of officer to receive mail and his complete business address.

Leave this space for binding

The purposes for which the corporation is formed and the nature of the business to be transacted by it are as follows:

M. To manufacture, assemble, fabricate, process, produce, purchase, receive, lease as lessee, or otherwise acquire, own, hold, store, use, repair, service, maintain, mortgage, pledge, or otherwise encumber, sell, assign, lease as lessor, distribute, and otherwise dispose of, and generally to trade and deal in and with, as principal, agent or otherwise, special nuclear materials, nuclear fuel elements, radioactive materials, fissionable materials bearing slurries, dispersions or particle aggregates, radioactive isotope devices and components, reactors, reactor controls, reactor shielding, electronic devices, parts, systems and mechanisms, chemicals, metals and allied or incidental elements, and materials, and any and all machinery, tools, equipment, appliances, devices, supplies and materials used or useful in connection with or incidental to any of the foregoing.

To engage in and transact the business of research in nuclear physics, chemistry, metallurgy and electronics and allied or incidental fields; to carry on investigations and experiments of all kinds; to originate, develop, improve, record and preserve any discoveries, inventions, processes, formulae and improvements and to build, purchase, lease, acquire, own, hold, use, maintain, improve and operate radio isotope and other laboratories, factories, offices, structures and works and any articles, materials, machinery and equipment used for or in connection with any business of the corporation.

[illegible]

F.Y. Dec. 31

Texas Instruments, Incorporated (A) (Condensed)

On April 17, 1959, Texas Instruments Incorporated (TI) of Dallas, Texas, merged with the Metals and Controls Corporation (M & C) of Attleboro, Massachusetts. One of the fastest growing large corporations in the country, TI had achieved a compound annual growth from 1946 through 1958 of 38% in sales and 42% in net income. The president had publicly predicted that volume would more than double in 1959 to a sales level near $200 million. Almost half this growth, he added, might come through mergers, with M & C contributing $42 million to $45 million. To date TI's principal business had been in electronic and electromechanical equipment and systems, semiconductors and other components, and exploration services for oil, gas, and minerals.

So highly was TI regarded by the market that in May 1960 its common was selling at about 70 times the 1959 earnings of $3.59 a share.

M & C ACTIVITIES

Itself the product of a 1932 merger and a postwar diversification, M & C had three major groups of products: clad metals, control instruments, and nuclear fuel components and instrumented cores. The company had grown steadily, and in 1959 had plants in two U.S. locations and five foreign countries. Reflecting predecessor corporation names, the clad metal lines were known as General Plate (GP) products, and the control instrument liens were known as Spencer products. Included in the former were industrial, precious, and thermostat metals; fancy wire; and wire and tubing. Included in the latter were motor protectors, circuit breakers, thermostats, and precision switches. Among these Spencer lines there were some that utilized GP products as raw materials; i.e., GP thermostat bimetals and GP clad electrical contacts.

Apart from a portion of GP's precious metal products which went to

key considerations), most GP and Spencer products had to be designed to specific customer requirements and produced to customer order. Thus engineering know-how and close coordination between the sales and production departments on delivery dates were important. Owing to the technical nature of the products and also to their fast-changing applications, a company sales force with a high degree of engineering competence was essential. To serve its several thousand customers, many of whom purchased both Spencer and GP products, the company maintained a force of 50 men in the field, divided into Spencer and GP units.

With Spencer products facing important competition from four other firms in the $10 million to $40 million annual sales bracket, tight control of costs was important for securing the large orders generally placed by the kinds of customers to whom these products were sold. Buyers included manufacturers of fractional horsepower motors, household appliances, air conditioning, and aircraft and missiles. In contrast, GP industrial metals met no direct competition, although clad metals for industrial uses met with competition from alloys.

M & C's PREMERGER ORGANIZATION

At the time TI took over M & C, a task force of four junior executives had just completed, at the acting president's request, a critical study of M & C's organizational structure. So far its nuclear activities had been conducted by an entirely separate subsidiary, and the GP and Spencer activities had been organized as shown on Exhibit 1.

Under the acting president at the top level came a tier of predominantly functional executives (the vice presidents for marketing, engineering, and finance, the treasurer, and the controller). At the third and fourth levels of command, the structure increasingly showed a breakdown by product lines. For example, at the fourth level in manufacturing there were four separate groups corresponding to the major Spencer lines, and six separate groups corresponding to the major GP lines. Approximately the same breakdown appeared among the fourth-level product specialists in marketing. Although there was no profit responsibility at this level, the controller had been sending marketing's product specialists a monthly P & L by product line, in the hope of encouraging informal meetings among the people in marketing, engineering, and production who were working on the same lines.

Even at the second level, the predominantly functional division of responsibilities was neither complete nor unalloyed. Thus the vice president for marketing was also the vice president of Spencer Products, and in this capacity he had reporting to him the Spencer engineers. As a result, the company's vice president of engineering was, in effect, the vice president only of GP engineering, although he also served in an other-than-functional role by acting as the vice president of M & C International. (In 1958 exports and other foreign sales totaled about $2 million.)

I. INTRODUCTION

As directed by the Administrator of the Energy Research and Development Administration (ERDA) and the Chairman of the Nuclear Regulatory Commission (NRC), a proposed action plan has been prepared for improving the control and protection of nuclear materials at commercial facilities possessing strategically significant amounts* of high enriched uranium and plutonium. This proposed action plan has been prepared by a joint ERDA-NRC task force during the period from March 17 to May 17, 1976. This report summarizes the task force activities and recommendations.

Background

On March 12, 1976, the Administrator, ERDA, and the Commissioners, NRC, along with senior members of their staffs, met to review the status of safeguards investigations and evaluations conducted by the NRC during the previous three months. This review highlighted what appeared to be chronic difficulties at several facilities in meeting the NRC accountability requirements, as well as weaknesses in nuclear materials control and protection procedures as practiced by several facilities under current NRC regulations. While accountability problems were most evident at bulk processing facilities handling large quantities of materials for ERDA contract programs, the nuclear materials control and protection at most commercial facilities handling highly enriched uranium or plutonium was judged to be less than that desired by both ERDA and NRC.

*Two kilograms of plutonium or five kilograms of uranium-235 (contained in uranium enriched to more than 20 percent in the U-235 isotope). The significant quantities for special nuclear materials are established at a level judged to be substantially less than that required for the illicit manufacture of a nuclear explosive.

METALS & CONTROLS CORPORATION

NUCLEAR PRODUCTS DIVISION

P O BOX 898 ATTLEBORO MASS
TELEPHONE ATTLEBORO 1-2800

Weapons Documentation

January 16, 1956

Dr. Marvin Mann
Assistant Director
U.S. Patent Office Div. 70 ? |
Atomic Energy Commission
Division of Inspection
Washington, D. C.

Dear Dr. Mann:

With this letter we are sending Brochure PR-1050A, "Fuel Element Fabrication", and Catalog PR-700, "Composite Metals, Precious Metals and Electrical Contacts".

The former outlines the facilities of our Nuclear Products Division in the atomic energy field, and the latter describes products of our General Plate Division in the clad metals field, which is of related interest.

Our purpose in sending this literature is to acquaint you with our scope of operations in these two fields. Incidentally, you may be interested to know that our Nuclear Products facility--at present the largest and most complete in private industry in the country--is now being doubled is size with the erection of a new plant.

These facilities are available to authorized concerns--please let us know how we can be of assistance to you.

Cordially,

A. R. Matheson

A. R. Matheson
Product Manager
Nuclear Products Division

Enclosures: PR-1050A
PR-700

1956
Weapons Project

metallurgical products business and an evolution of control devices.

A General Plate publication of the early 50's, "Products Scope of Operations," states, "General Plate is not primarily interested in producing great quantities of materials that are commonly available from the large steel and brass producers. Instead General Plate is interested in doing the more unusual, difficult, and precise combinations which other companies cannot or will not attempt because of limited quantities or unsuitable facilities."

In the 60's, of course, the markets for clad metal materials systems are vast. The composites idea has come of age. And our intent to be the leading supplier of high volume composite materials such as building products, automotive material, printing plates, cable shieldings, and to offer substitute clad materials to conserve critical metals like silver and copper, is well known.

Our electromechanical controls of the 50's are rapidly finding partners in solid state, electronic and hybrid controls of the 60's. And the device character of our control products business is just now in an early stage of assuming a systems orientation. Complete electronic protection systems, etc., are making planned inroads into our product mix.

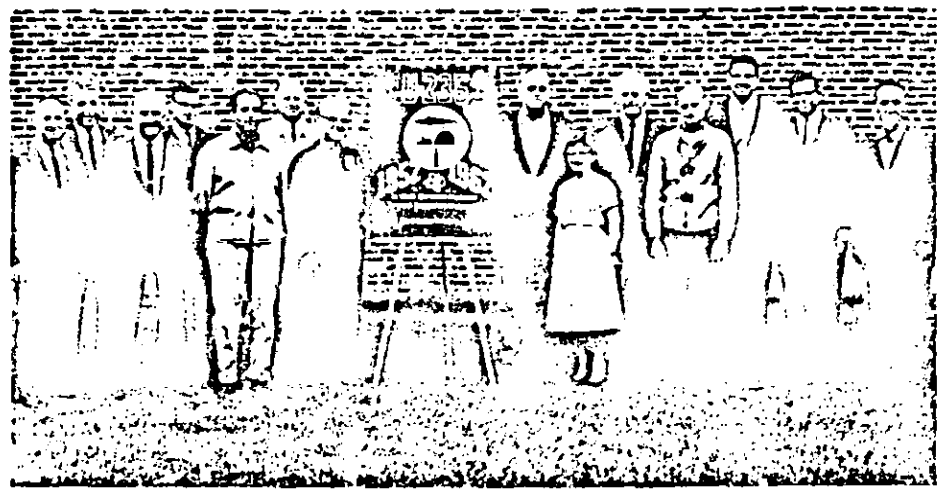
With the start of our nuclear fuel, core components and complete reactor cores business in 1952, a whole new group of diversified energy products and systems for M&C division seems imminent.

The future for the capabilities that we have developed here in the past 50 years are limitless in the face of increasing world-wide demand for better basic and clad materials and parts, energy sources, controls and control systems.

THE EXPANSION YEARS 1946 - 1966

Late in 1946, thousands of Attleboreans saw Mayor Francis J. O'Neil welcome veterans home at impressive exercises in Capron Park. The war was over. M&Cers came back to the M&C plant on the Cat - O' - Nine - Tail Swamp after they'd seen Paris.

Peacetime production was quickly resumed, with the average employee's weekly earnings about $45.



With George Williams (l.), vice president, NPG, and Mike Anthony (r.), manager of Facilities, on the tenth anniversary of Nuclear Products are the twelve original employees: Red Hill, Tom McGinn, Walter Cronin, Henry Paioni, Clyde DePriest, Ralph Purcell, Ellis Dean, Mac Brooks, George Durst, Everett Donnelly, Paul Moffat and Granville Robbins.

The post-war years were a period of change, and employee benefits were changing, too. In 1946 personnel practices were summarized in the first edition of a booklet which so many of the oldtimers *remember*, "The *Aims That Guide* Us." In 1950, M&C established a profit-sharing plan based on a percentage of corporate earnings plus credits for continuous years of service. M&C was considered an extraordinarily good place to work. *Terminations were extremely low.*

It was in the 40's that nuclear power entered the world's vocabulary. Attention quickly focused on its enormous potential for economic and social progress as a power source.

M&C's fourth decade was marked by our entrance into the nuclear fuel business in 1952. Fuel work, then part of the General Plate division, consisted of rolling normal uranium into thin gauges. General Plate, as one of the early operators *of a Sendzimir Mill and as a com*pany that had worked with many unusual materials, was able to demonstrate its ability to roll uranium.

So successful was the initial work that M&C submitted a proposal to the Atomic Energy Commission to set up facilities which could handle enriched uranium in moderate quantities, and not only roll the foil but do some further fabrication. By mid-1952, M&C had begun to provide the necessary security, space and equipment so that operations with the enriched uranium could get under way late in the same year.

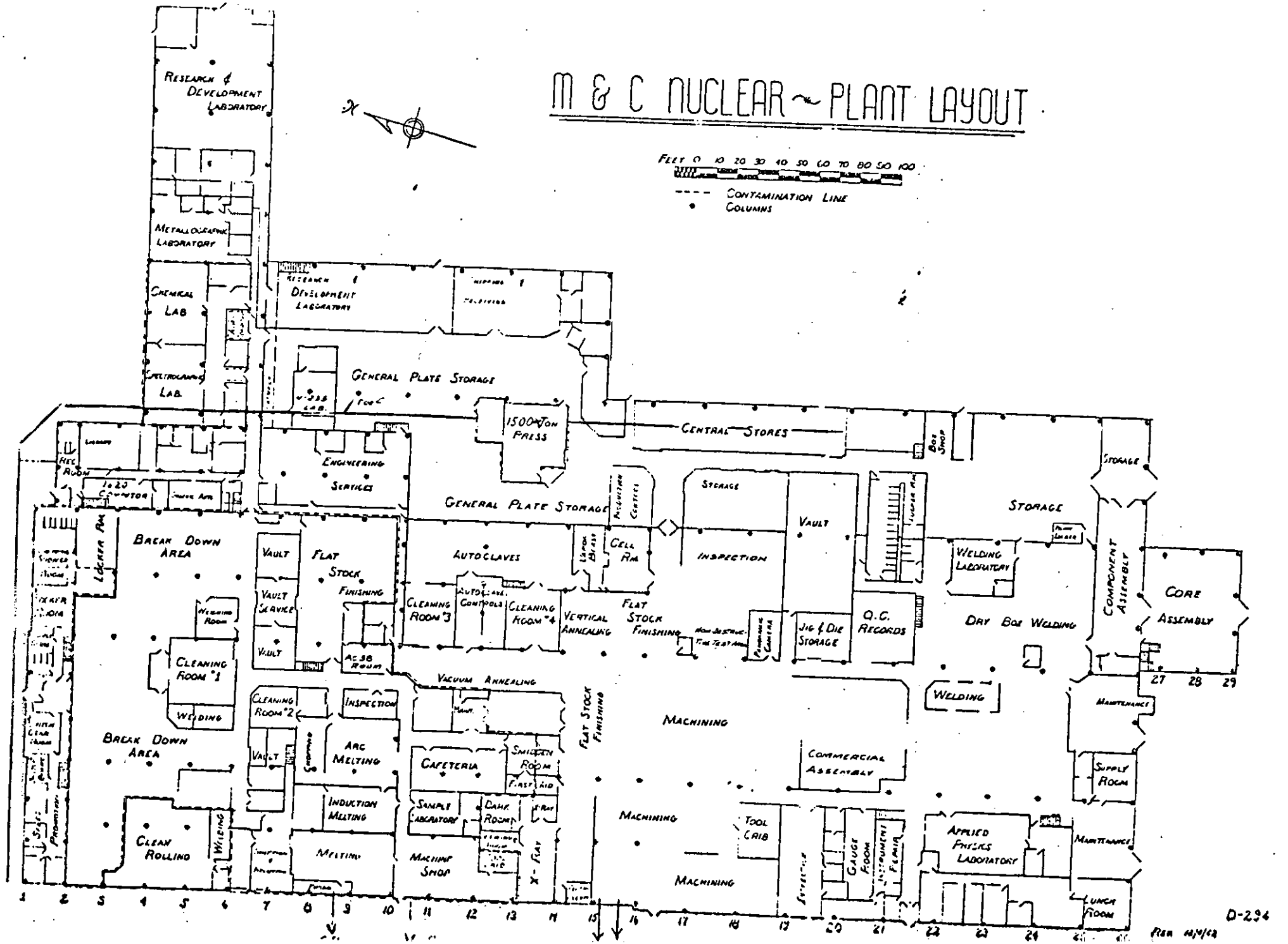
Nuclear operations in 1953 and 1954 were small, involving perhaps 30 people. However, much basic knowledge was developed, particularly how to cope with problems of security, accountability and *health physics.*

By 1956, nuclear operations had outgrown the original 8,000 square feet of space and a separate building (Building N) was started on what had been a softball field. This building was completed during the *summer of 1956 and consisted of* about 35,000 square feet. Since that time, several additions have been made, and Building N has multiplied in size six times, accommodating nuclear and other manufacturing operations plus research *and staff areas.*

The M&C nuclear facility was the first privately owned one of its kind licensed by the Atomic Energy Commission to handle enriched uranium. It became the world's largest nuclear fuel fabrication plant, *making a wide variety of* fuels for naval propulsion (under Vice Admiral Hyman Rickover's program), commercial power plants and experimental, training and test reactors. M&C supplied nuclear fuel for the nuclear powered aircraft carrier and the submarines.

PLANTS IN 10 OTHER CITIES

In 1954, with Gil Wood at the helm, Versailles Products was founded as a subsidiary company in Versailles, Kentucky. Today with over 500 employees, it operates as the Commercial Control department of Control Product Group.


M & C NUCLEAR ~ PLANT LAYOUT
FEET 0 10 20 30 40 50 60 70 80 90 100
CONTAMINATION LINE
COLUMNS
RESEARCH & DEVELOPMENT LABORATORY
METALLOGRAPHIC LABORATORY
CHEMICAL LAB
SPECTROGRAPH LAB.
RESEARCH & DEVELOPMENT LABORATORY
GENERAL PLATE STORAGE
1500 TON PRESS
CENTRAL STORES
REC ROOM
ENGINEERING SERVICES
GENERAL PLATE STORAGE
BOX SHOP
STORAGE
BREAK DOWN AREA
LOCKER RM
VAULT
FLAT STOCK FINISHING
AUTOCLAVES
CELL RM
STORAGE
INSPECTION
VAULT
STORAGE
WELDING LABORATORY
COMPONENT ASSEMBLY
CORE ASSEMBLY
VAULT SERVICE
CLEANING ROOM #3
AUTOCLAVE CONTROLS
CLEANING ROOM #4
VERTICAL ANNEALING
FLAT STOCK FINISHING
JIG & DIE STORAGE
Q.C. RECORDS
DRY BOX WELDING
CLEANING ROOM #1
WELDING
AC 36 ROOM
VACUUM ANNEALING
CLEANING ROOM #2
INSPECTION
WELDING
MACHINING
BREAK DOWN AREA
ARC MELTING
CAFETERIA
SMOKERS ROOM
FLAT STOCK FINISHING
COMMERCIAL ASSEMBLY
SUPPLY ROOM
INDUCTION MELTING
SAMPLE LABORATORY
CAMP ROOM
X-RAY
MACHINING
TOOL CRIB
GAUGE ROOM
INSTRUMENT REPAIR
APPLIED PHYSICS LABORATORY
MAINTENANCE
CLEAN ROLLING
WELDING
MELTING
MACHINE SHOP
MACHINING
LUNCH ROOM
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
D-294
Rev 11/4/62

I. PURPOSE

This procedure outlines the various forms of radioactively contaminated waste and scrap materials, and the methods to be used in collecting, handling, concentrating, segregating, storing, and disposing of them safely.

II. SOLIDS

A. Enriched uranium and its alloys.

1. Consists of machine turnings, foil, etc., which cannot be recycled by physical means.

2. Collected in the Fuel Manufacturing Area:

a. At each scrap producing operation, by the man doing the operation.

b. During collection, the maximum safe quantity is 350 grams U_{235}.

c. In 5-1/2 inch diameter by 15 inch high steel cans.

d. Cans are taken to the vault:

(1) For determination of the mass of contained U_{235} (the maximum safe quantity per can for storage and shipment is 350 grams U_{235}), and adjustment of material as necessary to meet the maximum safe quantity.

(2) Fluids are added to fill the voids around pyrophoric materials.

(3) The cans are hermetically sealed on a special can sealing machine.

e. Cans are stored and shipped:

(1) Contract material - 2 per drum type scrap shipping container - M&C Drawing 2-4000-A, a copy of which is included in the appendix of the Health and Safety Manual.

(2) License Material - 2 per drum type shipping container similar to the above except that the inner container will consist of a 6" diameter schedule 40 pipe with a 1/4" thick welded steel bottom closure. The top of the container will consist of either a flanged and gasketed bolted cover or a threaded pipe cap.

(3) 60 drum type containers of either type per two dimensional array.

(4) Separation between arrays will be maintained by a distance of (a) 12 feet or (b) the maximum dimension of the individual dimensions of adjacent arrays, whichever is greater or (c) 8" thick solid concrete walls.

(5) All enriched uranium scrap will be stored in the Nuclear building or in the Waste Treatment Area.

(6) Scrap material which is pyrophoric will not be stored in vaults in the presence of other special nuclear materials which depend upon moderation control for safety.

B. Natural uranium, depleted uranium, thorium, and their alloys.

1. Consists of massive metal, machine turnings, melting residues, mixtures with combustible or non-combustible waste, etc.

a. May or may not be recyclable, thus the material may be merely stored in the scrap area for future recycling.

b. Melting residues of uranium (thorium is not melted) may contain concentrated daughter products which may be more hazardous than the uranium itself.

2. Collected in the Fuel Manufacturing Area:

a. In ordinary steel 55 gallon drums and 5 gallon pails.

b. By production personnel.

3. Natural and depleted uranium will be stored and handled separately from special nuclear materials. In no case will significant quantities be in close proximity to special nuclear material.

a. Finely divided pyrophoric metals including melting residues shall be stored under water, soluble oil, perchlorethylene, or other liquid specified by the Health-Physicist; other materials are stored dry, in segregated areas, in the same containers they are collected in. All containers are covered with snug-fitting lids.

4. Final disposition of these materials is by direction of the customer.

C. Uranium and thorium contaminated combustibles.

1. Collected in ordinary steel 55-gallon drums.

2. Material shall be hand separated into two groups by Salvage personnel.

a. Paper and non-oily rags.

b. Metal, plastic, asbestos, oily rags, and anything else that will not burn or will generate large quantities of smoke. This material is considered non-combustible rubbish.

c. The maximum net weight of combustible material to be burned at any one time is 60 kg (132 lbs). This has been established as safe based upon the following conservative assumptions:

(1) The total weight of combustible waste contains 10% fuel alloy, or 6000 grams.

(2) Fuel alloy contains 5% fully enriched uranium which is equivalent to less than 300 grams U-235 or an always safe mass per incinerator batch.

(3) Actual analysis average less than 0.1 w/o U-235 per container of ash.

4. Polyethylene liners which are used in the collection drums shall be knotted to enclose the waste and charged into the burning chamber to avoid the spread of airborne particulate.

5. The incinerator shall be operated without filters. The high combustion temperature has proven sufficient to eliminate airborne contamination. Air samples shall be collected at the stack or in a downwind direction whenever incineration is performed and records maintained by the Health-Physics Department.

6. Ashes shall be wet down and shoveled into ordinary steel 55-gallon drums, or dry vacuumed into ordinary steel 55-gallon drums. Respirators shall be worn while cleaning the incinerator. The incinerator shall be cleaned after each batch containing a maximum of 350 grams U-235. Health-Physics personnel shall collect air samples during the cleaning operation.

7. Samples of ash shall be taken from each drum of ashes and analyzed for U-235 content by gamma counting techniques. After analysis, ash drums shall be handled in the same manner as those drums containing enriched uranium bearing liquids.

8. The incinerator area shall be washed or vacuumed every other day. Wash water shall be processed through the evaporator.

9. Ashes shall be accumulated until a sufficient quantity is available to warrant disposal by means of land burial at an AEC or licensed burial ground.

D. Uranium and Thorium Contaminated Salvageable Non-Combustibles

1. Consists of scrap metals (primarily steel and copper) and used machinery and equipment.

2. Scrap metal shall be collected in ordinary steel 55-gallon drums.

3. Drums, machinery and equipment shall be stored in the Waste Treatment Area or the Stockade.

4. Prior to disposition, all materials shall be surveyed for surface contamination by Salvage or Health-Physics personnel.

   a. Scrap metals

      (1) Less than 500 disintegrations per minute per 100 square centimeters (d/m/100 cm^2) average and 5000 d/m/100 cm^2 maximum may be disposed of without restrictions.

      (2) Less than 5000 d/m/100 cm^2 average and 25,000 d/m/100 cm^2 maximum may be sold to special scrap dealers licensed to receive such material.

      (3) Greater than 25,000 d/m/100 cm^2 must be decontaminated before disposition.

   b. Machinery and equipment

      (1) Less than 50 d/m/100 cm^2 removable and 500 d/m/100 cm^2 fixed, except on actual work surfaces which may be 2000 d/m/100 cm^2 fixed, may be released to the general public without restrictions. Recipients must be licensed to possess special nuclear material in accordance with provisions of 10CFR70.

      (2) If machinery or equipment is to be taken into smidgen clean areas, the maximum allowable contamination levels shall be 1.0 d/m/100 cm^2 removable and 50 d/m/100 cm^2 fixed.

      (3) Levels higher than these must be reduced by decontamination before disposition.

   c. The receiver of scrap or equipment which meet the above standards shall be notified that the material is contaminated and that a copy of the survey results is available upon request.

   d. When large areas of the scrap or equipment are inaccessible for survey, the material shall be treated as contaminated and shall be excluded from unrestricted disposal. This material and others for which decontamination is deemed impossible or undesirable may be retained for on site burial in accordance with provisions of 10CFR20, paragraph 20.304.

E. Uranium and thorium contaminated non-combustible junk and rubbish shall be collected and stored in ordinary steel 55-gallon drums with lever-lock covers. Disposal shall be made through authorized agencies or licensees or through burial on site when permitted by 10CFR20.304.

LIQUIDS

A. Enriched uranium and its alloys in immediately recoverable concentrations -- solutions only.

1. Consists of process acid solutions which are exhuasted, or in which the uranium is approaching the maximum allowable concentration, and laboratory acid wastes.

2. Collection

a. In ICC Type 6J 55-gallon (215 liter) drums with ICC Type 2S polyethylene liners, sealed to prevent evaporation.

b. The maximum safe concentrations shall be 2 grams U_{235} per liter.

(1) U_{235} concentrations in pickle tanks shall be estimated by weight loss of material passing through the tanks.

(2) When estimated U_{235} content approaches a concentration of 2 grams per liter from weight loss data, a representative sample will be withdrawn and analyzed for U_{235} content by means of gamma counting techniques. Based upon the results of this analysis, acid solutions may then be transferred to 55-gallon polyethylene lined barrels containing a boric acid solution with a minimum of 1.8 lbs boric acid.

(3) Laboratory waste shall be maintained below the maximum safe concentration by means of a running tally on additions to the waste container.

(4) No restrictions need be placed on the number of drums which may be collected in an array for storage or shipment.

c. Acid wastes shall be stored until enough drums are accumulated for an economical shipment; they will then be shipped by truck to Oak Ridge, or elsewhere at the customer's disposition, for recovery of the uranium.

B. Dilute uranium and thorium mixtures, suspensions and solutions requiring concentration before recovery.

1. Consists of floor and other wash water containing enriched, natural and depleted uranium and thorium in concentrations higher than those permitting release to ground water, streams, etc., yet not concentrated enough for reclamation.

2. Collection

   a. In ordinary steel 55-gallon drums with lever-lock covers.

3. Concentration - Material Handling Personnel

   a. Liquids

      (1) A typical 55-gallon drum, after 24 hours settling, will contain about 90% liquids and 10% sludge; many analyses have shown that all but about 5% of the U-235 is contained in the sludge.

      (2) After settling for 24 hours, a sample will be withdrawn from the supernatant liquid and analyzed for U-235 content by means of gamma counting.

      (3) After analysis, the liquids from these 55-gallon drums shall be pumped into the 600-gallon evaporator. The sludge from the bottom of the drums shall not be picked up. The maximum safe quantity in the evaporator shall be 350 grams U-235. The evaporator shall be thoroughly flushed with water to prevent an accumulation of concentrate on a monthly schedule.

      (4) After evaporation, the sludge shall be pumped into 55-gallon drums. An absorbent material such as vermiculite shall be added to each drum prior to sealing.

      (5) No restrictions need be placed on the number of drums which may be collected in an array for storage or shipment.

      (6) When a sufficient number of drums has been collected, they will be shipped to an AEC licensed facility for land burial.

   b. Sludge

      (1) The sludge which has settled to the bottom of a 55-gallon drum makes up about 10% of the volume of wash waters, and contains about 95% of the U-235 based upon analytical data.

      (2) After the liquids have been removed to the evaporator, the sludge shall be agitated by stirring for one minute.

      (3) Three samples shall be taken from three different spots on the bottom of the drum. These three samples shall be combined and analyzed for U-235 content by gamma counting techniques.

      (4) After the analysis results are obtained, the sludge may be combined with more sludge in an ordinary steel 55-gallon drum. The maximum safe quantity of U-235 contained in sludge in a 55-gallon drum shall be 430 grams -- this is equivalent to 2 grams per liter. An absorbent material such as vermiculite shall be added to each drum prior to sealing.

(5) No restrictions need be placed on the number of drums which may be collected in an array for storage or shipment.

(6) When a sufficient number of drums has been collected, they will be shipped to an AEC licensed facility for land burial.

4. Liquids in this category which are either solutions or easily dispersible suspensions (i.e., after settling 24 hours, no appreciable settling occurs) may be released to sanitary sewers. Batches of at least 1000 gallons shall be collected, allowed to settle for 24 hours and sampled. If no settling occurs in the sample, and sample analysis shows activity levels to be lower than those in the appendices of 10 CFR 20 revised, the batch may be released to the sewers.

STACK EFFLUENTS

A. All air exhausted from hoods, dryboxes, flexible pickups, etc. which might contain radioactive contaminants shall be drawn through high efficiency filters.

1. The filters are nominally 99.9% efficient for collection of particles greater than 0.3 microns in diameter, and are only slightly less efficient for smaller sizes.

2. Stack velocities of 4000 feet per minute produce average effective stack heights of 100 feet above the ground. This, coupled with large distances downwind to habited areas, provides significant dilution and dispersion of all exhaust effluents.

B. General building air shall be exhausted directly to the atmosphere without filtration. Control of radioactive aerosols at work points will prevent their release to the general air.

C. Monitoring all stacks for contamination release shall be done bi-monthly until such time as a revised sampling procedure which is currently under investigation has been developed.

COLOR CODING OF SCRAP AND WASTE COLLECTION DRUMS

Materials shall be placed in drums according to the following coding:

A. Yellow - denotes enriched uranium bearing or contamination.

1. Solid - with polyethylene liner - acid solutions.

2. With green stripe - combustibles.

3. With blue stripe - solutions and suspensions other than acid.

4. With black stripe - scrap metals, contaminated only.

B. Red - denotes natural and depleted uranium and thorium baaring or contamination.

1. Solid - natural or depleted uranium or thorium metal.
2. Solid - with polyethylene liner - acid solutions.
3. With green stripe - combustibles.
4. With blue stripe - solutions and suspensions other than acid.
5. With black stripe - scrap materials, contaminated only.

Black - uncontaminated metal scrap.

Blue - clean area only - waste for city dump.

Gray - uncontaminated combustibles.

Black - with white stripes - zirconium chips.

SPECIAL STUDIES

ARIZONA WATER STUDY

A feasibility study of the possible application of nuclear explosives involving water management in the State of Arizona, given the name "Aquarius," was begun in July 1968. This study is being carried out jointly by the AEC, the Department of the Interior, and the State of Arizona, in response to a request by the Governor of Arizona.

INDUSTRIAL SERVICE ORGANIZATIONS

The growing Plowshare service industry has been encouraged by the interest of a number of companies in this new field. The following companies have either established organizations or otherwise indicated their interest in providing partial or complete design, advisory, and operational services to user firms contemplating industrial applications of nuclear explosions.

Applied Nuclear Company, La Jolla, California
AVCOR, Incorporated, Hawthorne, New York
Bechtel Corporation, San Francisco, California
CER Geonuclear Corporation, Las Vegas, Nevada
Dravo Corporation, Pittsburgh, Pennsylvania
Fenix and Scission, Inc. - Dowell, Tulsa, Oklahoma
Geo-Kinetics, Inc., Concord, California
Geonuclear Nobel-Paso, Geneva, Switzerland
Gibbs & Hill, Inc., New York, New York
Gulf General Atomic, Inc., San Diego, California
Holmes and Narver, Inc., Los Angeles, California
Kaiser Engineering, Inc., Oakland, California
Kaman Sciences Corp., Bethesda, Maryland
Lockheed Missiles and Space Company, Sunnyvale, California
Mechanics Research, Inc., Tacoma, Washington
The Ralph M. Parsons Company, Washington, D. C.
Terra Dynamics, Inc., San Leandro, California
Texas Instruments, Inc., Dallas, Texas

The above list of existing or potential Plowshare service companies is provided as a convenience only, and may not necessarily constitute a correct, complete, or up-to-date listing.

U_3O_8
8.00/lb.

See Pg. 285 Report on Nuclear industry 1970" for more info

3/28/80

Council insists on bidding for sludge

Keane blocked from signing contract with precious-metals recycler

By LEO PELOQUIN
Sun Chronicle Staff Writer

ATTLEBORO – The city will entertain bids for the rights to its sewage, Mayor Gerald Keane said Wednesday, after failing to convince the City Council to let him contract immediately with a Virginia recycling firm.

Meeting with eight members of the council, City Solicitor John Jacobi III and Keane tried to convince them to let the mayor sign a contract with World Resources Co. of McLean, Va. The firm, which wants to extract precious metals from the sludge and ash byproduct of the city's sewage plant, would pay the city a minimum, of $50,000 this year, with a potential payment of up to $400,000.

The maximum figure in the agreement is open-ended because the city would enter a partnership with the firm. Depending on the value of each ton of sludge, the city's profits will rise above the initial $50,000. Most of the sludge will be recycled outside the city.

The request, in effect, asks the council to ignore a new ordinance regarding the sale of city-owned "personal" property passed in January. The ordinance requires open bidding of such sales, and a council approval process which takes up to four months.

Jacobi said the bid process was not necessary because World Resources holds the exclusive patent on the metals extraction process. Company President Gerald Halpin, also at the session, confirmed Jacob's statement.

"No one has ever done this before in history, frankly," he said. "And no one else is doing it now but us."

Keane and Jacobi, who negotiated the pact with Halpin, said entertaining bids would only complicate matters. "The way the contract is set up, I'm not sure we could bid it," Jacobi said.

Halpin said he did not object to the bid process, but he called it "an exercise in futility." He said he wasn't sure how much more time he could devote to pursuing Attleboro's sewage, a project he has been negotiating for four months.

But the councilmen were concerned about the propriety of ignoring the new ordinance and the potential for setting a dangerous precedent. There was considerable concern expressed about how "above-board" the signing of a contract with World Resources would look to the public if no bids were asked for.

"For the 'clean-air factor,' put the thing out for bids," said at-large Councilman John Parker. "Do it so there's no aroma whatsoever."

Jacobi said that until recently he didn't realize the sale of the sludge would require City Council approval. The previous property sale ordinance had only been legally applied to the sale of city-owned real estate.

Council President Mark Mercier seized on the issue to focus on his recent complaints about Keane taking the council for granted. In a heated exchange with the mayor that brought about the end of the meeting, Mercier said, "You want a bunch of yes-men, Gerry, but you're not going to get them. No more yes-men."

Jacobi suggested later that the council design a set of general bid specifications and authorize Keane to work out the details of any agreement. Several persons at the meeting said the bid process might bring other proposed uses for the sludge, such as its potential value as fill.

Ordinance Committee Chairwoman Judith Robbins said she felt the property sale ordinance should be amended to provide for contract negotiations such as the sludge sale. But she said the council should still have final say on any property sales.

Halpin declined to discuss details of the firm's offer after the meeting. He said he considered it privileged information between him and his client, the city, not to be discussed until a deal was signed. But he did acknowledge that his four-year-old company has similar agreements with four other U.S. cities.

Company officials have said before they are particularly interested in Attleboro's sewage because of the local jewelry industry. Some precious metals slip into the sewage from jewelry manufacturing.

Halpin said the firm knows there is value in Attleboro's sludge because of a costly study it performed on sludge from the present sewage plant.

took place about once per week and the ashes would be picked up by Messrs. Gousie, LaChance, and Carr and put into drums to be sent to Oak Ridge. He said that the distance from the incinerator to the area where zirconium was burned was about 300 feet. The incinerator was on a cement slab measuring about 20 feet square. He said that they had to wear protective clothing inside the fenced area where they burned the zirconium and the contaminated material (in the incinerator) at separate locations. They also had to put on protective clothing to burn the zirconium. The zirconium chips which were burned inside the fenced-in area were brought there by fork lift truck. He said that the protective clothing was worn in the zirconium-burning area only as a precaution and that they washed down the fork lift truck every so often. Mr. Gelinas said that to the best of his knowledge, Cleo (Forcier) never found any contamination in the area where the zirconium was burned. He said that no dirt was ever removed from the fenced-in area. Danny Lopes and George GIancey (phonetic), who are now deceased, used to haul trash from the TI site. Mr. Gelinas said that he had no knowledge of any dirt having been removed from the TI site. With regard to the railroad spur which was constructed in the general vicinity of the fenced-in area around Building 5, Mr. Gelinas said that they had to build up the area (i.e. use land fill) for the railroad bed in order to build the spur. He said that he has no knowledge of any excavation work performed in connection with the railroad spur construction. He said that there was never any burning done outside the fenced-in area, mentioned above, except for an area near Building 12 where burning of zirconium was done after this type of burning operation was transferred from the Building 5 area to the Building 12 area around 1965 or 1966. The area in question is situated near or in the parking lot in the vicinity of Building 12.

With regard to the material burned in the incinerator, as mentioned above, it was brought there in 55-gallon drums.

Interview of Mr. William Bird, an employee of Texas Instruments (TI), Attleboro, Massachusetts, on January 9, 1979. Mr. Bird furnished the following information to NRC Inspectors R. E. Shepherd and R. H. Smith in the presence of Mr. Fred Sherman and Mr. John A. Haug: Mr. Bird said that he was employed as a vault custodian in Building 10 from about 1957 until the phase out of that building in 1965. His job responsibilities included the packaging of contaminated material, usually solid chips, which would be put in a solution and

then into 1 and 2-gallon metal containers which would be marked to indicate radioactive material. The containers were then taken from the site by an AEC appointed carrier. He said that he had no knowledge of anything having been taken from the TI site to the Shpack dump site in Norton. He said that Jeff Gelinas was the foreman of the scrap area (with regard to the scrap taken from Building 10) and that Joe Carr and Frank Gousie worked for Mr. Gelinas. Mr. Bird said that the only burning of material that he knows about is the burning of zirc chips in an open area in back of Building 5, possibly a hollowed out area, and that those who burned the zirc chips included himself, and Messrs. Gelinas, Carr, and Gousie. He said that he did not see any incinerator or furnace in that area while he was there. He said that they burned zirc chips about once per month while Building 10 was involved in the nuclear fuel operation. He said that he is not sure, but thinks, that they shipped out the zirconium ashes in barrels and that these barrels did not have radioactive material stickers on them. He said that they used shovels to put the zirc ashes in the barrels. He said that this was the only burning area that he knows about. He said that he had no knowledge of any dirt having been removed from the TI site. Regarding the construction of the railroad spur at the TI site around 1965, he said that he does not recall that they had to do any digging but he recalled that the job had more to do with leveling off the area for the railroad bed.

Interview of Mr. Anthony Cavalieri, President, Patsy Cavalieri and Son, 279 Elm Street, Attleboro, Massachusetts, on January 9, 1979. Mr. Cavalieri furnished the following information to NRC Inspectors R. E. Shepherd and R. H. Smith: He said that his company did not construct the railroad spur at the Texas Instruments (TI) facility. He suggested that the Westcott Construction Company, which has done construction work at TI, might have information regarding the railroad spur project.

Interview of Mr. Andy DeAngelis, President, DeAngelis Railroad Construction, 9 Irving Street, Worcester, Massachusetts, on January 10, 1979. (Mr. DeAngelis was initially contacted by telephone by R. E. Shepherd on January 9 and arrangements were made to interview him at a job site in Holliston, Massachusetts, on January 10.) Mr. DeAngelis furnished the following information to NRC Inspectors R. E. Shepherd and R. H. Smith: He said that around 1976, he removed a section of railroad track at the Texas Instruments (TI) site and

that his company was a subcontractor for Westcott Construction Corporation which was the prime contractor on that job for TI. He said that the section of track was over 200 feet long and was about the length of Building 4 which is situated alongside the area from which the track was removed. He said that he did not have to remove any dirt or material in connection with that job. He said that he did not know the exact dates when this work was done. He said that the work done by his company involved only the removal of the railroad ties and track. He said that someone stole about 5 or 6 of the railroad ties and he then took the remaining ties (approximately 200) to his storage yard which is located at 1187 Millbury Street, Worcester, Massachusetts. He said that his company did not handle the construction of the railroad spur which was constructed at TI around 1965. He said that the only railroad track which he constructed for TI was a 300 foot section of track which his company, as the prime contractor for TI, constructed during the Summer of 1978. This was an extension to an existing railroad spur. He said that Narraganset Company was also doing work at TI when his company was laying the section of track, mentioned above, and that some other company was putting in a drain under the track. He said that when his company laid the 300 feet of railroad track, he removed about 3 truck loads of asphalt which he took to the Narraganset Company's private dump in Attleboro. He said that Bruce, whose last name he could not recall but who is a superintendent for the Narraganset Company, told him to take it there. Mr. DeAngelis said that when he was laying the section of track in 1978, they ran into a steel pipe, measuring about 12 inches in diameter and about 20 feet long, which had about one inch of dirt around the inside circumferance. He said that the "TI people" told him to remove the pipe and he took it to his company's storage yard in Worcester.

Mr. DeAngelis said that he saw other contractors removing truck loads of dirt from the TI site but he does not recall who they were or where they took it. He said that his company has records and photographs of the 2 jobs, mentioned above, which were done at the TI site and which whould be available to the inspectors at his place of business in Worcester. Messrs. Shepherd and Smith informed Mr. DeAngelis that they would visit the storage yard in Worcester where the railroad ties and steel pipe are presently stored and he said that he would arrange to have someone there to show these items to the inspectors upon their arrival at the storage yard later on this same date (January 10).

Interview of Mr. Joey DeAngelis, Estimator, DeAngelis Railroad Construction, 9 Irving Street, Worcester, Massachusetts, on January 10, 1979. Mr. J. DeAngelis furnished the following information to NRC Inspectors R. E. Shepherd and R. H. Smith: He said that the DeAngelis Company, working as a subcontractor for Westcott Construction Corporation, removed a section of railroad track outside Building 4 at the Texas Instruments (TI) facility in 1977. In doing this job, the DeAngelis Company removed the steel rails and wooden ties and brought the ties to the DeAngelis Company's storage yard in Worcester, Massachusetts, where they are presently stored.

During July and August 1978, the DeAngelis Company, working as a prime contractor for TI, laid a section of railroad track which became an extension to an existing railroad spur at the TI site. In doing this job, the DeAngelis Company did some excavation work to prepare the railroad bed and had to remove 4 buried steel plates and a section of steel pipe. The steel plates ranged in thickness from 1/4 inch to 2 inches and measured about 4 feet wide and 6 feet long. The steel pipe measured about 20 feet long and 12 inches in diameter. The steel plates and pipe were also removed from the TI site and taken to the DeAngelis Company's storage yard in Worcester, Massachusetts. The inspectors visited the storage yard on January 10, 1979 and observed the railroad ties, steel plates, and steel pipe mentioned above. The storage yard is enclosed by a chain-link fence with gates which are locked.

Mr. J. DeAngelis showed the inspectors photographs of the railroad job sites at TI which were taken by him when the DeAngelis Company worked on these two jobs in 1977 and 1978. He also had records regarding the various types of work involved in constructing the railroad spur in 1978 and these records showed that it was necessary to dig up a section of asphalt and dirt to prepare the railroad bed. The records showed that the dirt was removed on August 12, 1978 but do not indicate where it was removed to.

Interview of Mr. Charles H. Whitmore, Jr., Project Manager and Safety Director, Westcott Construction Corporation, 135 East Washington Street, North Attleboro, Massachusetts, on January 10, 1979. Mr. Whitmore was interviewed by NRC inspectors R. E. Shepherd and R. H. Smith regarding any knowledge that he might have about the railroad spur constructed at the Texas Instruments (TI) facility around 1965. He said that he would review his company's records but believed that

the Westcott Construction Corporation may have been the prime contractor for that job and that the A. A. Accaro Company, Franklin, Massachusetts, was the subcontractor. He said that he would have more definite information after reviewing his records and would have this information available on January 11.

Mr. Whitmore was reinterviewed on January 11 and he said that his company was not involved in the construction of the railroad spur as previously reported, although his company has done construction work at the TI facility. He said that he has no knowledge of any dirt or debris having been removed from Texas Instruments (TI) by his company, either as a prime contractor or through a subcontractor, with the exception of the excavation for the foundation for the addition to Building 4, which was done during June, July, and August 1976. He said that the excavated material was put into Dorrance Company trucks and that the Westcott Company had hired Dorrance to do that work. He said that this material was taken by Dorrance Company to the Attleboro Landfill Corporation dump and to another Dorrance-owned site in the Norton-Attleboro area.

Joint Interview of Individual C, who requested that his name be kept confidential and Mr. Anthony F. Ferreira, Facility Engineer, Texas Instruments (TI), on January 11, 1979. Individual C and Mr. Ferreira furnished the following information to NRC Inspectors R. E. Shepherd and R. H. Smith in the presence of TI representatives F. Sherman and J. A. Haug: Both Individual C and Mr. Ferreira said that the Cavalieri Company installed the railroad spur at the TI site in 1965. When informed that the inspectors spoke with Mr. Anthony Cavalieri (of Patsy Cavalieri & Son) and were told by him that his company did not build the railroad spur, they indicated that the railroad spur was built by Mr. Cavalieri's father and that the Cavalieri Company constructed the railroad track and that Dorrance Excavation Company did the grading work for the railroad bed.

Mr. Ferreira said that he saw the work being done on the railroad spur construction by both the Cavalieri and Dorrance Companies. He said that the Dorrance Company had to do some excavation work on the north end of the construction area where a section of the track

was subsequently removed by the DeAngelis Company. He said that the whole railroad spur job (excluding the work done later by the DeAngelis Company) was done in the middle of 1965. Individual C said that the Accaro Company, Franklin, Massachusetts, had nothing to do with the construction of the railroad spur. (The name of this company was mentioned by R. E. Shepherd as possibly being the subcontractor on the railroad spur construction, based on information furnished to R. E. Shepherd by Mr. Charles Whitmore, of Westcott Construction Corporation, on January 10, 1979).

Mr. Ferreira said that the Dorrance Company brought in "fill" to grade the track near the junction where the spur connected to the main track. He also said that neither the Dorrance Company nor the Cavalieri Company took anything off the TI site in connection with the railroad spur construction.

Individual C said that when the DeAngelis Company installed a railroad spur last year (as an add-on to the existing spur), the DeAngelis Company removed from the TI site an area of asphalt, measuring about 20 feet wide, 100 feet long, and about 2 inches thick, but Individual C did not know where this material was taken after leaving the TI site. Individual C said that Mr. DeAngelis asked where he could dump the asphalt and was told that he (Mr. DeAngelis) could dump it in the Attleboro Landfill dump site. Individual C said that there was a steam pipe which Mr. DeAngelis had to remove when constructing the railroad spur in 1978. He said that this was originally a steam pipe going from Building 6 to Building 10, i.e. it was a steam intake pipe into Building 10 from Building 6.

With regard to the road constructed near the south side of Building 10, Mr. Ferreira said that the Narragansett Company and the Dorrance Company were the two prime contractors for the road construction work performed around the TI site.

Individual C said that Building 12 was built during 1967 and 1968 and that a small cement walk, measuring about 4 to 6 inches deep, about 10 feet wide, and about 300 feet long, and connecting parking lot "O" with Building 12, was built over an onsite dumping area which measured about 300 feet in diameter. Individual C said that he did not have any idea as to the depth of the dumping area or as

to what was dumped there. He also said that he did not know how long the dumping area was used and he did not see anyone dump anything in that area. Individual C also said that he never saw anything taken from TI property in connection with the construction of Building 12 and the cement walkway mentioned above.

Mr. Ferreira said that "they" burned some zirconium scraps in 55-gallon drums in the above-mentioned dumping area but that this was done simply for fire-extinguishing instruction purposes. He said that this is the only area where he (Ferreira) saw anyone burn anything on the TI site. R. E. Shepherd showed Mr. Ferreira a diagram of the TI facility and pointed to an area on the diagram which was an area where Mr. A. Amancio said that he had burned zirconium. Mr. Ferreira said that the place where he (Ferreira) saw zirconium being burned, solely for fire instruction purposes, was in the same general vicinity as that which was reported by Mr. Amancio as the area where he (Amancio) burned zirconium.

Interview of Mr. Cleo Forcier, Group Safety Engineer, Texas Instruments, Attleboro, Massachusetts, on January 11, 1979. Mr. Forcier furnished the following information to NRC Inspectors R. E. Shepherd and R. H. Smith: He said that he has been working at the Texas Instruments (TI) site in Attleboro for 22 years and was employed as a Health Physics (HP) inspector during the period that Building 10 was in operation with regard to nuclear fuel operations. He said that, to the best of his knowledge, material such as paper towels and rags, which came from Building 10, were taken to the incinerator, which was located in a carport-type structure adjoining Building 5, without having a radiation survey performed on such material. The people who used the incinerator wore protective clothing, including gloves, disposable shoe covers, and film badges. He said that Joe Carr and Jeff Gelinas did some of the burning in the incinerator and that the ashes were put into 55-gallon drums which were then brought back into Building 10. He said that he performed periodic radiation surveys of Building 5 and the general area where the burning in the incinerator was done.

With regard to an onsite dumping area located between Buildings 11 and 12, he said that this dump area contained stacks and duct work from Building 10, after the phase out of Building 10. All of the scrap from Building 10, after it (the scrap) was decontaminated was sold to "Miller", a scrap dealer in Attleboro, whom he could not

identify more specifically. Mr. Forcier said that he (Forcier) and his associates at Metals and Controls did the "decon" job of Building 10, using soap and water, and muriatic solution, if necessary. He said that everything was surveyed for contamination before it left the building. He said that no liquid waste was put into the onsite dumping area. He said that he never saw, nor had any occasion to survey, any truck containing trash going to any local dump. He said that zirconium was burned in only one area on the TI site and that this was in the fenced-in area near Building 5, at a "good distance" from Building 5. The only burning areas that he knows about are the incinerator burning area and the zirconium burning area mentioned above. He said that none of the company's truck drivers ever asked him to survey anything that they were going to transport somewhere. He said that he has no knowledge of any dirt, debris, or rocks having been taken from the TI site.

He said that he could not recall what was done with the residue from the steam-cleaning "decon" job of Building 10. He said that Charles Enthwistle (phonetic) participated in the "decon" job and that Enthwistle is still employed at TI. Mr. Forcier did the radiation surveys with regard to the "decon" job but he did not do the actual steam-cleaning and does not know who did the steam-cleaning job. He did not know if Dunlap, a name mentioned by R. Shepherd, did the steam-cleaning job.

Mr. Forcier said that he does not know if any contaminated material was put into the onsite dumping area mentioned above. Also, he said that he does not know why any material was put into the onsite dumping area nor does he know who was responsible for putting anything into this area. He said that he had no knowledge of a water evaporation operation in Building 5. He said that he has no knowledge of what was done with the zirconium ashes from the burning area, in the vicinity of Building 5, mentioned above. He said that he has no knowledge of any sign or sign post used at the site and which had words to the effect "Radioactive Material, No Trespassing Beyond This Point." He said that the onsite dumping area was a hole, about 15-20 feet deep which was covered with about 10 feet of dirt.

Interview of Mr. Melvin Dorrance, President, Dorrance Construction Company, Norton, Massachusetts, on January 12, 1979. Mr. Dorrance furnished the following information to NRC Inspectors R. E. Shepherd and R. H. Smith: With regard to the construction of the railroad

spur at Texas Instruments (TI) in Attleboro, Massachusetts, which was constructed around 1965, he said that his company removed approximately 200 loads of peat from the construction area and took it to Mr. Dorrance's privately owned dumping area on Harvey Street, Norton, Massachusetts. He said that his company did not dump anything at the Shpack dumping site in Norton which his company removed from either TI property or from Engelhard Industries property in Plainville, Massachusetts. He said that his company brought some old houses to the Shpack dumping site to be burned there but that these houses did not come from TI or Engelhard Industries property.

F. Conclusions

The conclusions related to Allegation No. 1 and the investigation findings associated therewith are discussed in NRC:I Investigation Report No. 078-154, dated March 1, 1979.

With regard to Allegation No. 2, it has been verified through visual examination of the Norton landfill area (Shpack property) that certain items discarded there bore the names "Texas Instruments" and "Metals and Controls". None of these items were found to contain radioactive material or radioactive contamination as determined by the radiological surveys which were conducted at the above site and detailed in NRC:I Investigation Report No. 078-154.

It has been determined through interviews with TI personnel and other individuals that this company, operating under the name Texas Instruments, Metals and Controls Corporation and/or M&C Nuclear Corporated, has employed various members of its maintenance force to haul trash from the TI facility in Attleboro to the Norton landfill area (Shpack property) on a frequent basis over a number of years. One TI employee who was involved in TI's trash disposal operations stated that he hauled two loads of dirt, consisting of ashes from burned zirconium chips and wooden skids, from the TI facility to the Norton landfill area. The information developed through the interviews with TI personnel and other individuals failed to substantiate that the TI items discarded at the Norton landfill area were radioactive.

It was also determined that M&C Nuclear, Inc., Attleboro, Massachusetts, which merged with TI in 1959, had used the aforementioned landfill area to discard trash and other material, including burned zirconium ashes, associated with nuclear fuel operations conducted at the TI facility from about 1957 to 1966. Based on NRC's review of TI's nuclear operations at that location and the analyses of the radioactive material found at the Norton landfill area it is possible that TI was the major source of that material. Other possible sources of the radioactive material could not be determined because of the limited amount of radioactive physical evidence found at the Norton site.

U... NUCLEAR REGULATORY COMMISS...
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report No. 078-154-A - Part 2 of 2

Subject: Radioactive Material in Uncontrolled Location, Norton, Massachusetts

Investigation at: Norton and Attleboro, Massachusetts

Investigation conducted: November 14, 1978 - April 1, 1979

Investigator: Walter H. Martin — 6/7/79
Walter G. Martin, Chief, Safeguards Branch — date signed

Approved by: James M. Allan — 6/12/79
James M. Allan, Deputy Director, Region I — date signed

Investigation Summary:

Investigation on November 14, 1978 - April 1, 1979 (Report No. 078-154-A - Part 2)
Area Investigated: Investigation to determine the source of uranium material found in Norton landfill area. The investigation was based on allegations by Mr. John Sullivan, 33 Chartley Brook Lane, Attleboro, Massachusetts, that Texas Instruments of Attleboro possibly had discarded radioactive material at a private landfill area in Norton, Massachusetts. This investigation concerns itself solely with the uranium material found at the Norton landfill area.
Results: It has been determined that M&C Nuclear, Inc., a totally owned subsidiary of Metals & Controls Inc. (now Texas Instruments) worked with the three types of material found at the Norton landfill site. Other possible sources of the material could not be identified. All of these materials were of the type used in performance of work on AEC contracts by M&C Nuclear and are not representative of any license activities of any companies in the area.

2222

TABLE OF CONTENTS

I. REASON FOR INVESTIGATION

During the investigation initiated on November 14, 1978 and continuing through January 12, 1979 at the Norton landfill area and several other locations in the Attleboro and Norton, Massachusetts areas, samples were taken from the Norton landfill for analysis of the radioactive material. The analyses indicated that depleted, normal and enriched uranium materials were present at the Norton landfill area. This investigation was performed in two parts; the first part concerned itself with interviews of involved personnel and the second part with records and contract reviews, along with a limited number of interviews. This is the second part of that investigation.

II. DETAILS

A. Introduction

The results of the Norton, Massachusetts landfill sample analyses as of December 1, 1978, indicated that large quantities of depleted uranium and lesser quantities of normal and enriched uranium were present at the landfill site. Uranium materials were not found to be present at the other landfill areas surveyed. The results of the analyses of material from the Norton site are shown in Table I. In order to confirm the results of the enriched uranium samples, additional analyses of these samples were performed at the U.S. Department of Energy, New Brunswick Laboratory, Argonne, Illinois. The Analytical Service Request and results of these analyses are included as Enclosure 1 to this report.

B. Scope of Investigation

This investigation was initiated on November 14, 1978 to determine the possible source of the uranium materials found at the Norton landfill site. The investigation was performed in two parts with the first part concerned with interviews of people concerned with the landfill activities and the possible source of the material and the second part includes a detailed analysis of the material and a review of the work performed by companies in the area during the time span from the year 1957 through 1968. The activities of 13 companies within a radius of 45 miles were reviewed as possible sources of the material. Eleven of these companies were eliminated due to the distance from the landfill site and the type of work performed. The previous activities of D. E. Makepeace and M&C Nuclear Inc. were considered to be the most likely sources of the uranium and the investigation concentrated on their activities.

C. Individuals Directly Interviewed or Contacted During the NRC Investigation

1. Mr. Kenneth C. Duffy, San Diego, California: Mr. Duffy was the Nuclear Materials Accountability Representative for M&C Nuclear from November 1957 to March 1963.

2. Mr. George H. Scott, Jr.: General Manager, Engelhard Minerals & Chemicals Corporation, Route 152, Plainville, Massachusetts.

3. Mr. William I. George: Assistant Vice President, Texas Instruments Inc., Attleboro, Massachusetts.

4. Mr. Fred Sherman: Project Manager, Texas Instruments Inc., Attleboro, Massachusetts.

5. Mr. Ronald Donn: Argonne National Laboratory

6. Mr. George Morgan: Schenectady Naval Reactors Office

D. Investigation Findings

The results of the analyses as of December 1, 1978, indicated large quantities of depleted uranium and small quantities of normal and enriched uranium were present at the Norton landfill site.

A review of the work performed by D. E. Makepeace, Division Engelhard Industries, Plainville, Massachusetts (now Engelhard Industries) during the period 1957 through 1968 did not reveal work performed during that time span which had any similarity to the enriched samples from the Norton landfill area. D. E. Makepeace had performed work with enriched, depleted and normal uranium. The enriched material was not of the type found at the Norton landfill area and there were no large quantities of depleted material unaccounted for.

A review of the work performed by M&C Nuclear Inc., a totally owned subsidiary of Metals & Controls Inc. (now Texas Instruments) revealed that M&C Nuclear had performed work with materials similar to the enriched uranium samples found at the Norton landfill site as well as with normal and depleted uranium.

Table I reveals that many of the areas surveyed and analyzed at the Norton landfill area contained depleted uranium material. M&C Nuclear Inc., in a contract with Argonne National Laboratory, performed a large fabrication job with depleted uranium. Upon completion of this work, there was a depleted uranium loss in excess of one ton. In several telephone conversations with Mr. Kenneth Duffy, former Nuclear Material Accountability Representative for M&C Nuclear, it was learned that M&C Nuclear burned depleted uranium chips and turnings in order to render it non-pyrophoric prior to returning this material to Argonne National Laboratory.

This burning was accomplished out of doors in open trays which frequently spilled over or failed. The ground around these trays was often covered with depleted uranium. It was also learned that large quantities of soil were contained in the drums of material returned to Argonne as a result of trying to shovel this material into drums for return. The area where this burning occurred was cleaned and it is fairly certain that the material resulting from the cleanup was taken to the Norton landfill area. A parking lot and railroad spur are now in the area where the burning took place. A copy of the correspondenc relating to this contract and the missing depleted uranium is presented as Enclosure 2 to this report.

THIS PARAGRAPH HAS BEEN INTENTIONALLY DELETED; IT CONTAINED CONFIDENTIAL-RESTRICTED DATA - UNAUTHORIZED DISCLOSURE SUBJECT TO ADMINISTRATIVE AND CRIMINAL SANCTIONS.

Mr. K. C. Duffy also furnished information with regard to uranium-aluminum fabrication work performed at M&C Nuclear during the period from 1957-1963. He states that there were several contracts for uranium-aluminum work with uranium enriched to small fractions below 20%. One job of this type performed for Belgium had uranium unaccounted for in excess of normal limits. These jobs were performed on a U.S. Government to Foreign Government contract through Metals & Controls Inc. Sample F-12 in Table I represented also by NBL Sample No. E 5581A in Enclosure 1 is the sample of this type of material found at the Norton landfill site.

Mr. Duffy also related that the licensed material at M&C Nuclear during the time span under investigation consisted primarily of uranium metal foil and foil grade ingots of various enrichments. The materials were pure uranium unalloyed with other materials. They were present in small quantities when compared with the M&C Nuclear government contract material.

Materials of unalloyed enriched uranium were not found to be present at the Norton landfill area.

E. Conclusions

The conclusion of this investigation is that M&C Nuclear Inc. was the probable source of the uranium materials found at the Norton landfill site and that the materials identified were from contract work performed by M&C Nuclear Inc. for the Atomic Energy Commission.

TABLE I

Norton, Mass. Landfill Sample Results as of December 1, 1978

Sample No.	Location	Date Sampled	Sample Results	Radiation Survey Results contact (G-M)
0-1	See Map	10/24/78	Depleted Uranium. U-238 in -35 mesh soil fraction = 2.25 ± 0.9 E-1 uCi/gm. X-ray diffraction and emission spectrographic analyses indicated Uranium and Silica the major components with Uranium as U_3O_8 and UO_2.	2-6 mR/hr
0-2	See Map	10/24/78	Natural Uranium. U-238 in -35 mesh soil fraction = 1.35 ± 0.45 E-6 uCi/gm.	2-6 mR/hr
0-3	See Map	10/24/78	Depleted Uranium. U-238 in -35 mesh soil fraction = = 9.01 ± 0.32 E-2 uCi/gm.	10-15 mR/hr
1-1	Hole A top 6"	10/31-11/2/78	-35 mesh soil fraction is depleted Uranium. The soil is approximately 26% Uranium; the Uranium concentration in the soil = 8.6 E-2 uCi/gm. A metal strip found in the soil contains enriched Uranium to approximately 8%. X-ray diffraction and emission spectrographic analyses indicated the metal strip to be Uranium and Zirconium.	10-15 mR/hr

Sample No.	Location	Date Sampled	Sample Results	Radiation Survey Results contact (G-M)
1-2	Hole A (east side) 3" from top	10/31-11/2/78	-35 mesh soil fraction is depleted Uranium. The soil is approximately 36% Uranium. X-ray diffraction and emission spectrographic analyses indicated Uranium in the Forms $UO_3 \cdot 2H_2O$ and MgU_2O_6.	~ 30 mR/hr
1-3	Hole A 12" depth	10/31-11/2/78	Depleted Uranium.	2 mR/hr
1-4	Hole A 21"-23" depth	10/31-11/2/78	Depleted Uranium and Radium.	1 mR/hr
1-5	Hole B top 3"	10/31-11/2/78	Radium and Uranium-235 present. Ra^{226}/U^{235} = 36*.	2-3 mR/hr
1-6	Hole C 9" depth	10/31-11/2/78	-35 mesh soil sample contains Radium. The radium concentration in the soil = 1.4 $\pm$ 0.3 E-2 uCi/gm.	3 mR/hr
1-7	Hole C surface	10/31-11/2/78	Radium and Uranium-235 present. Ra^{226}/U^{235} = 20*.	1 mR/hr
1-8	Hole D surface	10/31-11/2/78	Radium and Uranium-235 present. Ra^{226}/U^{235} = 26*.	0.3 mR/hr

Sample No.	Location	Date Sampled	Sample Results	Radiation Survey Results contact (G-M)
1-9	Hole D-1 surface	10/31-11/2/78	Radium and Uranium-235 present. Ra^{226}/U^{235} = 78*,	0.3 mR/hr
1-10	Hole D 6" depth	10/31-11/2/78	Radium only.	0.2 mR/hr
1-11	Hole D-1 3"-6" depth	10/31-11/2/78	Radium and Uranium-235 present. Ra^{226}/U^{235} = 45*,	0.3 mR/hr
1-12	metal casting	10/31-11/2/78	The casting contains Uranium enriched to 15 weight percent. X-ray diffraction and emission spectrographic analyses indicated Uranium and Aluminum in the Form UAl_3.	~ 30 mR/hr
1-13	Mud A	10/31-11/2/78	Radium and Uranium-235 and 238 present. Ra^{226}/U^{235} = 1.	0 mR/hr
1-14	Mud B	10/31-11/2/78	Radium only.	0 mR/hr
1-15	Mud C	10/31-11/2/78	Radium only.	0 mR/hr
1-16	Mud D	10/31-11/2/78	Radium only.	0 mR/hr

1 of 1

ENCLOSURE 1

U.S. Department of Energy
· Brunswick Laboratory
Argonne, Illinois
Analytical Service Request

12-21-78	R:1		W. MARTIN
Norton Dump (NRC)	Norton, MA	—	—

Description of Samples (include known impurities and approximate enrichment)

U-AL CASTING

U-Zr CHIP

Classification

Sample		Report
X	Unclassified	X
☐	Confidential	☐
☐	Secret	☐

(If sample is classified, state basis for classification, e.g., shape, composition, impurities, etc.)

Analyses Requested

U-AL CASTING
1.) wt/o U
2.) % U^{235}

U-Zr CHIP
1) w/o U
2) % U^{235}

3.) CHECK FOR PRESENCE OF Ti, greater than trace quanity

Reporting Basis
- ☐ As-recd. Wt.
- ☐ Dry Wt.
- ☐ Pickled Wt.

Reporting Unit
- ☐ Wt./Sample Wt.
- ☐ Wt./Sample Vol.
- ☐ Wt./Element Wt.
- ☐ Other (specify)

NBL Sample No.	Requestor's Sample No.	NBL Sample No.	Requestor's Sample No.	NBL Sample No.	Requestor's Sample No.
EU-5581A	Resl/ID # 11479-12				
EU-5582A	Resl/ID # 11474-1				

Date Analytical Service Request Received: | Date Samples Received: 12/21/78 | Date Samples Shipped:

Sample Condition and Appearance:

DOE-CH 406 (5-78)

ORIGINAL

2/21/79 | Norton Dump | 1 of 1

U.S. Department of Energy
New Brunswick Laboratory
Argonne, Illinois
Report of Analysis (General)

NBL Sample No.	Requestor's Sample No.	Wt.% U	At. Wt.	Standards		
EU-5581A	Resl/ID # 11479-12					
SUBSAMPLE 1		39.63	237.44	A, B		
SUBSAMPLE 2		39.78	237.44	A, B		
SUBSAMPLE 3		37.29	237.44	C, D		
SUBSAMPLE 4		38.44	237.44	C, D		
EU-5582A	Resl/ID # 11474-1	7.29	235.20	E, F		

Comments or Notes:

Unknown Control Standards (% Relative Difference from Assigned Values)

A. -0.06 B. -0.09 C. +0.04 D. -0.08 E. -0.04 F. -0.06

Carl Hassell
Signature

Carl Hassell, Jr., Chief
Name, Title

Uranium/General Chemistry Section
Organization

Copies:
W. Martin, NRC-1

ORIGINAL

2/21/79 | Norton Dump | 1 of 1

U.S. Department of Energy
Brunswick Laboratory
Argonne, Illinois
Report of Analysis (Isotopic)

NBL Sample No.	Requestor's Sample No.	Wt. % ^{234}U	Wt. % ^{235}U	Wt. % ^{236}U	Wt. % ^{238}U	
EU-5581A	Resl/ID # 11479-12		19.857 ± 0.16% ✓			
EU-5582A	Resl/ID # 11474-1		92.913 ± 0.013% ✓			

NBL Sample No.	Requestor's Sample No.	Wt. % ^{238}Pu	Wt. % ^{239}Pu	Wt. % ^{240}Pu	Wt. % ^{241}Pu	Wt. % ^{242}Pu

Amos W. Summers
Signature

Amos W. Summers, Chief
Name, Title

Mass Spectrometry Section
Organization

Copies:
W. Martin, NRC-I

Comments or Notes:

Results are corrected to NBS standards for this level. Relative 95% confidence limits for individual reported values are as listed.

FORM NO. DOE-CH4558 (5-78)

ORIGINAL

2/21/79 | Norton Dump | 1 of 1

U.S. Department of Energy
New Brunswick Laboratory
Argonne, Illinois
Report of Analysis (Elemental)

☐ Element ☐ Sample ☐ As rec'd. ☐ Fired ☐ Dried
☐ Wt % ☐ μg/g ☐ g/g ☐ g/l
VS = > 10% S = 1 — 10% M = 0.1 — 1% W = 0.01 — 0.1%
VW = 0.001 — 0.01% T = 0.0001 — 0.001% FT = < 0.0001% (-) = Not detected

NBL Sample Number	Requestor's Sample No.	NBL Sample Number	Requestor's Sample No.	NBL Sample Number	Requestor's Sample No.	NBL Sample Number	Requestor's Sample No.
EU-5581A	Resl/ID #11479-12 (b)			EU-5582A	Resl/ID #11474-1 (b)		

Ag	N	Ag	N	Ag	N	Ag	N
Al M	Na	Al	Na	Al	Na	Al	Na
As	Nb	As	Nb	As	Nb	As	Nb
Am	Nd	Am	Nd	Am	Nd	Am	Nd
Au	Ni	Au	Ni	Au	Ni	Au	Ni
B	O	B	O	B	O	B	O
Ba	Os	Ba	Os	Ba	Os	Ba	Os
Be	P	Be	P	Be	P	Be	P
Bi	Pb	Bi	Pb	Bi	Pb	Bi	Pb
Br	Pd	Br	Pd	Br	Pd	Br	Pd
C	Pr	C	Pr	C	Pr	C	Pr
Ca	Pt	Ca	Pt	Ca	Pt	Ca	Pt
Cd	Pu	Co	Pu	Cd	Pu	Cd	Pu
Ce	Rb	Ce	Rb	Ce	Rb	Ce	Rb
Cl	Re	Cl	Re	Cl	Re	Cl	Re
Co	Rh	Co	Rh	Co	Rh	Co	Rh
Cr	Ru	Cr	Ru	Cr	Ru	Cr	Ru
Cu	S	Cu	S	Cu M	S	Cu	S
Dy	Sb	Dy	Sb	Dy	Sb	Dy	Sb
Er	Sc	Er	Sc	Er	Sc	Er	Sc
Eu	Se	Eu	Se	Eu	Se	Eu	Se
F	Si	F	Si	F	Si	F	Si
Fe M	Sm	Fe	Sm	Fe M	Sm	Fe	Sm
Ga	Sr	Ga	Sr	Ga	Sr	Ga	Sr
Gd	Ta	Gd	Ta	Gd	Ta	Gd	Ta
Ge	Tb	Ge	Tb	Ge	Tb	Ge	Tb
H	Te	H	Te	H	Te	H	Te
Hf	Th	Hf	Th	Hf	Th	Hf	Th
Hg	Ti (-)	Hg	Ti	Hg	Ti (-)	Hg	Ti
Ho	Tl	Ho	Tl	Ho	Tl	Ho	Tl
I	Tm	I	Tm	I	Tm	I	Tm
In	U VS	In	U	In	U VS	In	U
Ir	V	Ir	V	Ir	V	Ir	V
K	W	K	W	K	W	K	W
La	Y	La	Y	La	Y	La	Y
Li	Yb	Li	Yb	Li	Yb	Li	Yb
Lu	Zn	Lu	Zn	Lu	Zn	Lu	Zn
Mg	Zr	Mg	Zr	Mg VS	Zr	Mg	Zr
Mn		Mn		Mn		Mn	
Mo		Mo		Mo		Mo	

Comments or Notes: Analysis by Emission Spectrography Unless Otherwise Noted Below

(a) Combustion - Gas Chromatography (b) X-Ray Spectroscopy (c) Atomic Absorption (d) Spark-Source Mass Spectrometry

(e)

Richard Graff
Signature

Richard Graff, Chief
Name Title

Spectrochemistry Section
Organization

Copies:
W. Martin, NRC-I

ORIGINAL

ENCLOSURE 2

M&C NUCLEAR, INC.
P. O. BOX 898 ATTLEBORO, MASSACHUSETTS, U.S.A.
TELEPHONE 1-3000

November 30, 1959

Filar AEC-37

AIR MAIL SPECIAL DELIVERY

Argonne National Laboratory
Box 299
Lemont, Illinois

Attention Mr. J. E. McKinley
Business Manager

Gentlemen:

In reply to your inquiry of October 28, 1959, we are pleased to furnish the following quotation.

M&C Nuclear, Inc. will supply 39,000 pieces of depleted uranium metal to the specifications contained in your letter, telegram of October 29, and Drawings SP-1-20811-8, SP-1-20812-8, and SP-1-20813-8 for a lump sum of $219,345.00.

We will require 68,000 kilograms of depleted uranium metal in the form of duction, approximately twelve inches in diameter and five inches thick, and weighing 300-350 pounds each. Our quotation assumes that the starting material will be supplied and delivered to M&C Nuclear, Inc. at no charge to M&C Nuclear, Inc. We have also assumed that usable metal and scrap remaining at completion of the order will be returned to Argonne National Laboratory at no cost to M&C Nuclear, Inc.

We estimate approximately 9,000 kilograms of usable material will remain at completion. Also, our quotation includes provision for our financial responsibility in connection with material losses. In computing our responsibility, we based our calculations on a charge of $8.15 per kilogram, the published price for depleted uranium (0.0040 w/o U235) as contained in the Oak Ridge price list of September 28, 1959. If the material is of a different percent depletion or there is a later price list of which we do not have knowledge, we would have to adjust our quotation.

Delivery will commence prior to January 31 and be completed by May 31, 1960, provided that we receive at least 25% of the required starting material by January 1 and 25% the first of each succeeding month through April 1, 1960. We would need an order by December 15, 1959, in order to preserve necessary tooling and supplies.

NUC Nuclear, Inc. will supply additional pieces of each size, in minimum quantities per order of 6,000 kilograms, for a charge per piece in accordance with the following table:

Nominal Size (in.)	Price Per Piece ($)
1 x 1 x 1	3.30
1 x 1 x 2	3.75
1 x 1 x 3	5.05
1 x 1 x 5	6.40
2 x 2 x 2	6.70
2 x 2 x 5	13.40
1/2 x 1 x 1/2	2.35
1/2 x 1 x 1	3.00
1/2 x 1 x 1/2	2.45
1/2 x 1 x 1	2.65
1/2 x 2 x 2	3.15
1/2 x 1 x 3	3.45

The above-quoted prices per piece are based on the same assumptions regarding starting material, scrap, and loss charges as our quotation for the 19,200 pieces. For any additional 6,000 kilogram order, we would require 7,500 kilograms of additional starting material. Needless to say, this requirement could be reduced by the use of usable scrap remaining at the completion of fabrication of the original order for 19,200 pieces.

In view of the variations in yield and manufacturing process requirements in any order of this magnitude, we would appreciate provision in your order for authorization for us to ship up to 10% in excess of the number of pieces required of each type, each to be invoiced at the unit prices listed in the above schedule.

NUC Nuclear, Inc. is an established accountability station (NUC) and has been for seven years. We have fabricated several thousand kilograms of uranium--enriched, natural, and depleted--for critical experiments, submarine propulsion cores, and reactors for research, training, and power generation. We also supplied Argonne National Laboratory enriched uranium pieces somewhat similar to this requirement in connection with your Fast Breeder Critical program of 1954-5. We operate in strict compliance with AEC health, safety, and security requirements as administered by the Schenectady and New York Operations Offices, and are presently doing work under several AEC contracts.

We will permit your inspection, examination, and test of materials and workmanship at all reasonable times during processing, but such actually must be subject to conformance with any security requirements of the AEC and company measures to safeguard proprietary information.

In order to guarantee the Laboratory that all pieces meet your requirements, it is our intention to conduct an initial run of approximately 625 pieces. We will calculate the density and then weigh and dimensionally inspect 100% of these pieces. We will then ascertain, to your satisfaction, that we can meet your weight specification without 100% weighing as long as we meet your dimensional specifications.

Our terms are net 30 days, and delivery is F.O.B. our plant, Attleboro, Massachusetts.

We have enclosed our standard patent indemnity, warranty, and nuclear hazards indemnity clauses for your consideration for inclusion in any purchase subcontract with which you may favor us.

Our base quotation will remain valid for 30 days from this date; our unit price quotation will remain valid until June 1, 1960.

NUC Nuclear, Inc. has processed over 15,000 pounds of U235 and 40,000 pounds of natural and depleted uranium during the past seven years. We have a privately owned facility of 202,000 square feet as well as the experience and capabilities needed to furnish the product to your coating specifications. We would be happy to provide more detailed information if you so desire. We look forward to your early authorization to fabricate the 39,800 pieces.

Cordially yours,

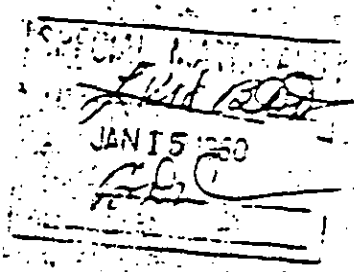
G. L. Williams
President

EF/sL

Encs.

ARGONNE NATIONAL LABORATORY
Lemont, Illinois

January 15, 1960



C. L. Williams, President
M & C Nuclear, Inc.
P. O. Box 898
Attleboro, Massachusetts

Re: Materials Processing Contract
No. 31-109-38-1162

Dear Mr. Williams

Enclosed are five copies of a proposed Subcontract No. 31-109-38-1162 between Argonne National Laboratory and M & C Nuclear, Inc. This subcontract provides for the fabrication and supply of 39,800 pieces of depleted uranium metal by M & C and gives Argonne the option to increase those requirements until June 1, 1960. The subcontract has been prepared in accordance with your proposal of November 30, 1959, as modified by Mr. Dutton's letter dated December 18, 1959.

We have carefully considered your proposed standard articles with respect to Patents, Warranty and Indemnity. I believe you will find that Patents and Warranty Articles appearing in the contract will be satisfactory to you. The Indemnity Article has not been incorporated in the subcontract; however, there is enclosed herewith a copy of a letter which I have signed quoting certain provisions of the Laboratory's Prime Contract with the United States Government, which indicates that the Laboratory has Price-Anderson nuclear hazards indemnity. I believe that you will find that the quoted provisions, when read in conjunction with the Atomic Energy Act, afford to you the protection which you are seeking. You will note also that we have incorporated in the subcontract a clause pertaining to responsibility for loss of material supplied by the Laboratory which essentially duplicates that clause proposed by your representatives upon their visit to the Laboratory on December 15, 1959.

The enclosed subcontract has been reviewed and approved by the Chicago Operations Office of the Atomic Energy Commission. If it meets with your approval, kindly execute and return four copies to this office.

The Laboratory will then complete the execution, obtain the signature of the appropriate representative of the Chicago Operations Office, AEC, and will return one fully executed and approved copy to you for your files. Upon your execution and return of the requested copies you may proceed with whatever work may be accomplished under the subcontract prior to the receipt of feed material.

Very truly yours,

J. H. McKinley
Business Manager

JHM:am
Enclosures

bcc: R. D. Devine
J. J. Dutton
A. C. Hixing
P. R. Shlesman

APPENDIX B

SCOPE OF THE WORK

1. ORIGINAL REQUIREMENTS

The Contractor shall fabricate and deliver to locations specified by the Laboratory 39,800 pieces of depleted uranium to the specifications contained in drawings SP-1-20811-B, SP-1-20812-B, and SP-1-20813-B attached to this contract and made a part hereof. The following weight requirements with a deviation of plus or minus 2 per cent apply:

Nominal Size (in.)	Quantity		Weight (gm) ± 2%	Maximum excess Authorized
	Original	Current		
1 x 1 x 1	200	409	301.1	20
1 x 1 x 2	1500	2,500	603.6	150
1 x 1 x 3	1600	2,600	906.2	160
1 x 1 x 5	6900	8,534	1511.0	690
2 x 2 x 2	4000	7,684	2419.0	400
2 x 2 x 5	5200	9,534	6063.0	520
1/8 x 1 x 1/2	200	350	18.35	20
1/8 x 1 x 1	300	600	36.79	30
1/8 x 2 x 1/2	1800	3,600	36.66	180
1/8 x 2 x 1	2000	4,000	73.50	200
1/8 x 2 x 2	7500	27,500	147.2	750
1/8 x 2 x 3	8600	60,600	220.5	860

In view of variations in yield and manufacturing process requirements in orders of this magnitude the Contractor is authorized to ship up to 10% in excess of the number of pieces required of each type described above.

2. OPTION TO INCREASE REQUIREMENTS

It is agreed that the Laboratory has the option to increase the requirements stated in section 1. above in increments of 6,000 kg. lots of finished pieces but not exceeding a total of 60,000 kgs. The Laboratory may exercise such option from time to time by written direction to the Contractor, and without formal supplement to this Contract, no later than June 1, 1960. The Contractor will be held to the exact requirements of any such direction and will not be paid for any pieces fabricated in excess of such requirements.

4. The price for depleted uranium pieces furnished by the Contractor pursuant to the authority granted him, in Section 2 of Appendix B, to exceed the requirements set forth in Section 1 of that appendix shall be determined in accordance with the following unit prices and the price so determined shall be payable under this contract in addition to the price stipulated in Section 1 above:

Nominal size piece (in.)	Unit price
1 x 1 x 1	3.19
1 x 1 x 2	3.74
1 x 1 x 3	5.03
1 x 1 x 5	6.37
2 x 2 x 2	6.67
2 x 2 x 5	13.33
1/8 x 1 x 1/2	2.34
1/8 x 1 x 1	2.99
1/8 x 2 x 1/2	2.44
1/8 x 2 x 1	2.64
1/8 x 2 x 2	3.14
1/8 x 2 x 3	3.43

5. Appendix B, Scope of the Work, is amended in its entirety to read:

1. Requirements

The Contractor shall fabricate and deliver to locations specified by the Laboratory 127,911 pieces of depleted uranium to the specifications set forth on drawings SP-1-20811-B, SP-1-20812-B and SP-1-20813-B attached to this contract and made a part hereof. The nominal sizes, quantities and weight requirements for such uranium pieces are as follows:

Nominal Size (in.)	Quantity	Weight (gm) ± 2%
1 x 1 x 1	409	301.1
1 x 1 x 2	2,500	603.6
1 x 1 x 3	2,600	906.2
1 x 1 x 5	8,534	1511.0
2 x 2 x 2	7,684	2419.0
2 x 2 x 5	9,534	6063.0
1/8 x 1 x 1/2	350	18.35
1/8 x 1 x 1	600	36.79
1/8 x 2 x 1/2	3,600	36.66
1/8 x 2 x 1	4,000	73.30
1/8 x 2 x 2	27,500	147.2
1/8 x 2 x 3	60,600	220.5

2. Variations

In view of variations in yield and manufacturing process requirements in orders of the magnitude provided for in this contract the

Contractor is authorized to deliver hereunder uranium pieces in excess of the quantities specified in Section 1 but such excess pieces shall not exceed the quantities hereinafter specified for the various sizes:

Nominal Size (in.)	Maximum Excess Authorized
1 x 1 x 1	20
1 x 1 x 2	150
1 x 1 x 3	160
1 x 1 x 5	690
2 x 2 x 2	400
2 x 2 x 5	520
1/8 x 1 x 1/2	20
1/8 x 1 x 1	30
1/8 x 2 x 1/2	180
1/8 x 2 x 1	200
1/8 x 2 x 2	750
1/8 x 2 x 3	860

6. All other terms, provisions and conditions of said subcontract will continue in full force and effect.

ARGONNE NATIONAL LABORATORY
(Operated by The University of Chicago)

By /s/ J. E. McKinley

Title Business Manager

METALS & CONTROLS INC.

By /s/ C. L. Williams
A & C Division

Title Product Group Manager

I, Townsend M. Gunn, certify that I am the _____ Secretary of the corporation named as the "Contractor" in the within Supplemental Agreement; that C. L. Williams who signed the said Supplemental Agreement on behalf of the Contractor was the MC Division Product Group Manager of said corporation; that I know his signature and his signature thereto is genuine; and that said Supplemental Agreement was duly signed, sealed and attested for and in behalf of said corporation by authority of its governing body.

By /s/ Townsend M. Gunn

Title Secretary

METALS & CONTROLS INC. P O BOX 966 · ATTLEBORO, MASS · CASTLE 9-3800

A CORPORATE DIVISION OF TEXAS INSTRUMENTS INCORPORATED

File: AML-37
November 21, 1963

Mr. J. E. McKinley
Business Manager
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois

Subject: Contract No. 31-109-38-1162

Reference: Your Letter of November 1, 1963 Addressed to Mr. R. Morrow

Dear Mr. McKinley:

On November 13, 1963 I telephoned to advise receipt of your November 1st letter and to express our surprise at your request. As stated at that time, M&C did not consider that we were financially liable for additional reported S.R. differences, based on earlier discussions with both Argonne and COO representatives.

I have reconstructed the following sequence of events from the file and pass them on to you for any comment or advise should we have misunderstood the situation:

1. Letter - Finerty of M&C to McKinley of ANL dated May 14, 1962 states M&C contention that ANL receivers samples not accurate enough to substantiate difference indicated.

2. Letter - McKinley of ANL to Finerty of M&C dated May 25, 1962 stating belief that ANL samples are adequate and referring M&C to the Commission and the disputes clause of the contract.

3. Letter - Finerty of M&C to Dunbar of COO dated June 6, 1962 enclosing above letters and requesting resolution of S.R. differences.

4. Letter - Finerty of M&C to COO in October, 1962 requesting information on findings.

From October of 1962 until your letter of November 1, 1963, there has been no written correspondence. However, during the interim, Mr. Ken Duffy our Accountability representative, was advised by Mr. Sheldon Kops of COO that the S.R. difference review by COO produced a decision in M&C's favor. This information was also confirmed orally by Mr. John P. Jewett,

BCE

Sk 11-2
Smk 2765

Assistant Manager for Administration, CCO to Mr. Duffy. Earlier this month, Mr. R. Corson, our current accountability representative, telephoned Mr. Kops to discuss the situation. Mr. Corson reports that Mr. Kops did recall a decision in M&C's favor.

In view of this information, which I believe to be factual, it appears that a reversal has occurred in the earlier CCO position. It does not seem appropriate that M&C should now be required to pay a penalty as a result of that changed position.

Our material balance records indicate a loss of 959 Kg, for which M&C is financially responsible. This amount we believe was accepted last year by CCO as an accurate and representative figure. We therefore request that the $10,145.00 amount currently being withheld on the contract be reduced to $5,350.00 and that amount be paid in full to M&C. This adjustment would represent payment by M&C of 959 Kg x $5.00 per Kg or $4,795.00 for material unaccounted for.

Very truly yours,

George P. Howland
Manager, Industrial Nuclear Products

GPH/be

METALS & CONTROLS INC. P. O. BOX 898 · ATTLEBORO, MASS. · CAPITAL 2-3800

A CORPORATE DIVISION OF **TEXAS INSTRUMENTS** INCORPORATED

File: ANL-37
January 3, 1964

JAH

Mr. J. H. McKinley
Business Manager
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60440

Subject: Shipper/Receiver Differences Concerning U_3O_8
Scrap Recovery Contract No. 31-109-38-1162

Dear Mr. McKinley:

As a result of the position stated in the Chicago Operations Office's letter of December 13, 1963 and the request contained in your letter of December 17, 1963, we have reviewed the provisions of the subject contract and the circumstances pertinent to the shipper-receiver difference regarding the amount of depleted uranium returned under the contract.

In view of the extended period of time this final matter under the contract has been under consideration; the fact that the material in question is no longer available in the state returned, if at all; and the unlikelihood that any additional facts can be developed to assist in resolving the shipper-receiver differences; we have attempted to develop an equitable basis for final settlement, all factors considered.

Our understanding of the value of the difference is $5,350, representing 1070 Kgs of depleted uranium at $5. per Kg. This amount has been established as follows:

Argonne's order No. 1162-7 dated 6/18/62 established uranium processing loss.	2029 Kgs x $5. = $10,145.
Metals and Controls records reflect uranium processing loss.	959 Kgs x $5. = $ 4,795.
Difference	1070 Kgs x $5. = $ 5,350.

Our records indicate that 991 Kgs of the total difference of 1070 Kgs is attributable to a shipment of 26 drums of unusable scrap in the form of metal and oxide on November 10, 1961. This shipment was recorded on SS shipping form 161 M&C/ANL 100. The remainder of the difference (1070-991) 79 Kgs has not been identified to any particular shipment of product or scrap under the contract.

In considering an equitable resolution of the difference of the 991 Kgs, we have reviewed the following pertinent circumstances and contract provisions:

a. The 26 drums of metal and oxide shipped on 11/10/61 represented the return of unusable scrap in a nonpyrophoric state.

b. This depleted uranium in the form of unusable scrap had no economical value. We understand it was disposed of as it was not suitable for processing for reclamation.

c. Our processing loss figure of 959 Kgs was established on the basis, among other factors, of the depleted uranium in the scrap form of dross (clinkers and fines).

d. We proposed various alternative methods of rendering the unusable scrap nonpyrophoric to AML during March 1961. Although some consideration was given to these alternatives, we were advised to burn the unusable scrap.

e. After burning we calculated from our original scrap weights the percent of depleted uranium in the resulting metal and oxide.

f. Upon receipt of the 26 drums of metal and oxide, AML took 1 sample from each drum to establish the percent of depleted uranium weight content of each drum.

g. We have questioned the reliability of this sampling technique for the type of material involved. It is to be recognized that there was no requirement nor attempt made to burn the unusable scrap to produce a uniform or homogeneous product. The objective was to render the material nonpyrophoric. A simple burning process was employed.

h. The percents established by AML's sampling compared to our figures has created the shipper-receiver difference of 991 Kgs.

i. The provisions of Section 4, Article II, of the contract establishes that we shall be financially responsible for processing losses of depleted uranium. Section 3, Article II, obligates us to render all unusable scrap nonpyrophoric by conversion to uranium oxide or other chemical treatment prior to shipment.

Our understanding of the intent of these provisions was to provide us with the maximum incentive to produce the pieces ordered with a minimum quantity of depleted uranium feed material, furnished by the Government at no cost to us. We performed the job in a manner consistent with this objective. Our records indicate that the overall yield in end product from the Government-furnished material was very good. This yield was obtained by recycling usable scrap to the maximum extent feasible. We understand that the yields we obtained surpassed those experienced by other contractors performing similar work.

It is our interpretation that any uranium loss involved in the burning of unusable scrap to render it nonpyrophoric does not constitute a "processing loss" within the intent of the provision in Section 4, Article II. This interpretation is supported by the fact that the unusable scrap to be burned had no useful value in its scrap form in the burned state of metal and oxide, or any residues from such burning. There was no economical advantage to be gained by us or the Government in rendering the unusable scrap nonpyrophoric. This material simply had to be made as safe as possible to handle and store until it could be properly disposed of by the Government. We expended our best efforts in actually burning the unusable scrap and returning it to Argonne for subsequent disposal.

In brief summary, we believe we delivered a quality product in a timely manner at a minimum cost, including the cost of depleted uranium feed material furnished by the Government. Payment for losses of depleted uranium scrap material which had no intrinsic or economic worth at $5. per Kg, or at any price, imposes a punitive measure never intended under the contract and serves no useful purpose either now or at the time the unusable scrap was rendered nonpyrophoric. Payment for worthless material alleged to be lost on the basis of a questionable sampling technique compounds the inequity that such payment would constitute.

In view of the preceding discussion, we consider that payment on our part for any part of the 991 Kg difference pertaining to the burned unusable scrap would be unfair and inequitable. Accordingly, we propose that we be credited for 991 Kgs of returned depleted uranium in the form of burned unusable scrap.

We have not attempted to establish the basis for the difference of the remaining 79 Kgs in question. It appears that the time and effort required to pinpoint this difference would delay final settlement and closing of the contract. Therefore, in the interest of avoiding any further delays, we propose that the processing loss of 959 Kgs be increased by 40 Kgs to a final total of 999 Kgs. The amount to be deducted for processing losses then would be $4,995. from the retainer of $10,145. The net amount payable would be $5,150.

We believe the proposed resolutions contained herein fairly establish our financial obligation for process losses consistent with the intent of the contract agreements. We will appreciate your consideration of our proposed settlement at an early opportunity.

Very truly yours,

George P. Howland
Manager, Industrial Nuclear Products

RS/be

METALS & CONTROLS INC. P O BOX 908 • ATTLEBORO, MASS. • CASTLE 2-3800

A CORPORATE DIVISION OF TEXAS INSTRUMENTS INCORPORATED

File: AEC-37
January 21, 1964

NOTED: P.R.S. 3
G.L.
J.L.C.
H.L.W.
R.B.S.
RECD. LEGAL DEPT.
JAN 24
ACTION Comp & SPM
FILE

AIR MAIL

Mr. J. E. McKinley
Business Manager
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60441

Subject: Shipper/Receiver Differences Under Contract 31-109-38-1162

Dear Mr. McKinley:

Your letter of January 15, 1964 indicates that our offer of January 2, 1964 leaves you without reasonable justification for proposing a settlement to the A.E.C.; and further that, if our position was firm, you would be compelled to refer the matter to the A.E.C. for resolution as a "dispute" pursuant to the terms of the contract.

We have again reviewed the pertinent circumstances and contract provisions pertaining to the question of the amount of depleted uranium contained in the unusable scrap returned in the form of metal and oxide. Additionally, we have carefully read Mr. McSwain's letter of December 13, 1963, which was transmitted by your letter of December 17, 1963.

The third paragraph of Mr. McSwain's letter states "-----there appeared to be no factual means existent to establish a clearly preferential degree of accuracy on the part of either party." regarding the shipper-receiver difference. We agree with the judgement on which this statement is based. The statement implies that an equitable settlement of the difference would be to "split-the-difference." Such a settlement would result in an increase in the amount we are to pay for processing losses under the contract of $2,675. ($5,350. ÷ 2) for a total cost to M&C of $7,470.

We believe a "split-the-difference" basis for settlement is not truly equitable to our position and would not give recognition to the following circumstances:

a). The intent of the contract provisions establishing a $5. per Kg penalty on uranium not returned was to provide an incentive to us to use the Government furnished material as economically as possible. We believe that this objective was realized. The high yield in our product from the Government furnished material was obtained by recycling scrap to the maximum extent feasible.

b). The penalty of $5. per Kg was not intended to apply to the rendering of unusable scrap to a nonpyrophoric state. The unusable scrap was worthless and there was no economic advantage to be gained by ourselves or the Government from use of the material. It simply had to be made as safe as possible for storage and handling incident to proper disposal.

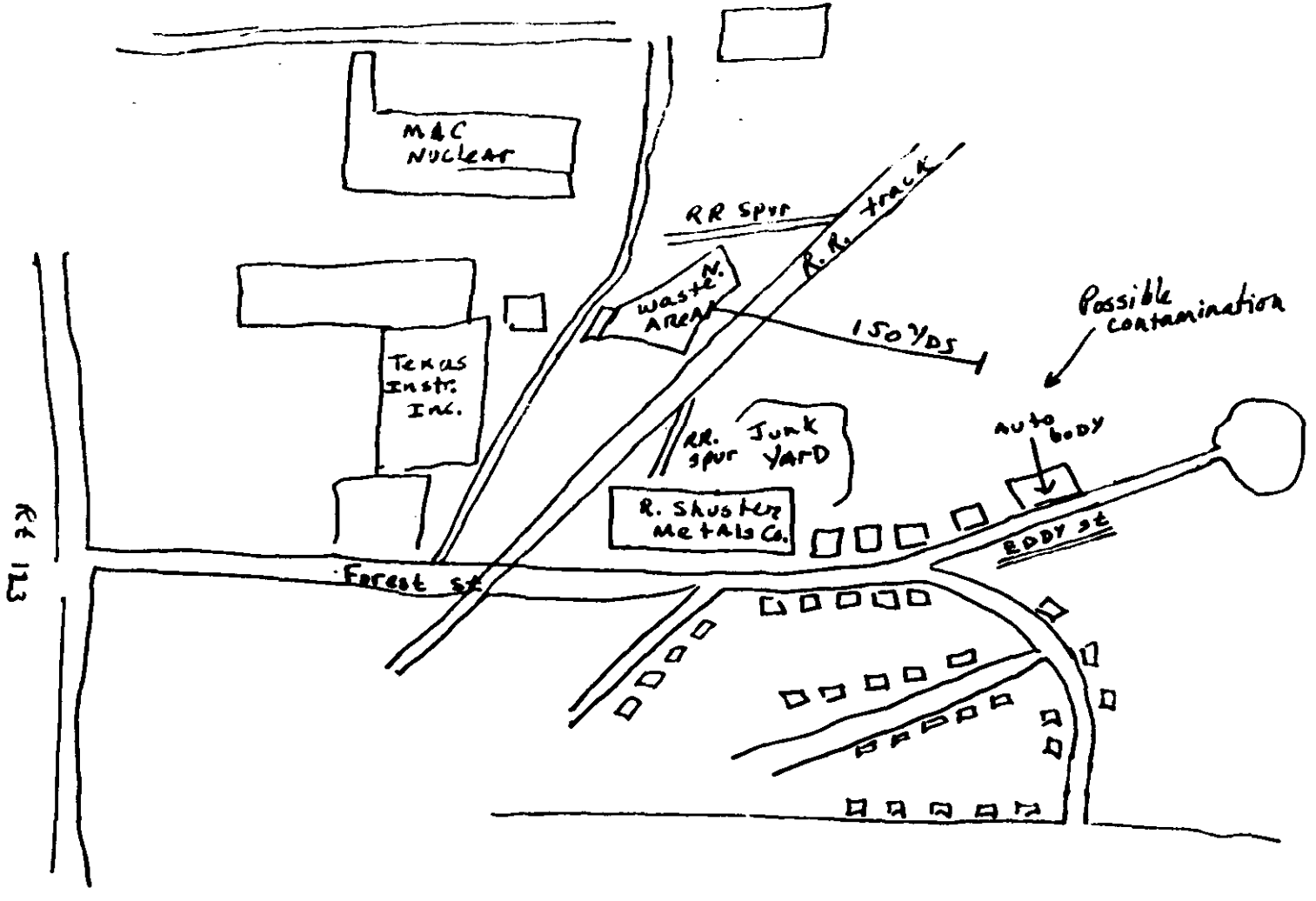
We would prefer that this matter be resolved without recourse to the disputes section of the contract. With this consideration in mind and in hopes of securing final resolution, we propose that our company pay to ANL a total amount of $6,195. Agreement on this amount increases our total liability substantially ($1,400.) and leaves a balance due us from the remainer under the contract of $3,950.

We trust that this proposal proves acceptable to you and permits you to secure the approval necessary from the A.E.C. to permit closing out of this order.

Very truly yours,

George P. Rowland
Manager, Industrial Nuclear Products

bs


M&C NUCLEAR
RR spur
R.R. track
Waste N. AREA
150 YDS
Possible contamination
Texas Instr. Inc.
RR. spur
Junk YARD
Auto Body
R. Shuster Metals Co.
Eddy st
Forest st
Rt 13

□ = homes